

# SEQUENCE LISTING

<110> Carozzi, Nadine  
Hargiss, Tracy  
Koziel, Michael G.  
Duck, Nicholas B.  
Carr, Brian

<120> AXMI-014, A Delta-Endotoxin Gene and  
Methods for Its Use

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Lys Asp Pro Asn Ile Phe Pro Ile Asn Leu Asp Ala Cys Gln Gly Arg
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Pro Trp Gln Asp Thr Trp Glu Ser Val Ser Asp Ile Val Thr Ile Gly
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aca tac ctt ata caa ttc ttg cta gaa ccc ggt ata ggt gga att cct 240
Thr Tyr Leu Ile Gln Phe Leu Leu Glu Pro Gly Ile Gly Gly Ile Pro
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Val Ile Phe Ser Ile Ile Asn Lys Leu Ile Pro Ser Ser Gly Gln Ser
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Val Ala Ala Leu Ser Ile Cys Asp Leu Val Ser Ile Ile Arg Lys Glu
100 105 110

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| Gln | Ala | Arg | Glu | Glu | Asp | Phe | Thr | Lys | Leu | Leu | Ala | Gly | Ser | Leu | Ser |      |
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| aga | cag | aaa | gct | gaa | ata | tta | tta | ttg | cct | acg | tat | gtg | caa | gct | gca | 576  |
| Arg | Gln | Lys | Ala | Glu | Ile | Leu | Leu | Leu | Pro | Thr | Tyr | Val | Gln | Ala | Ala |      |
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| aat | gtg | cat | tta | tta | cta | tta | agg | gac | gca | gtt | aaa | tat | aaa | aaa | gaa | 624  |
| Asn | Val | His | Leu | Leu | Leu | Leu | Arg | Asp | Ala | Val | Lys | Tyr | Lys | Lys | Glu |      |
|     |     | 195 |     |     |     |     | 200 |     |     |     |     | 205 |     |     |     |      |
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| Trp | Gly | Leu | Val | Cys | Pro | Pro | Leu | Tyr | Pro | Gly | Ser | Gly | Arg | Thr | Asp |      |
|     | 210 |     |     |     |     | 215 |     |     |     |     | 220 |     |     |     |     |      |
| tgt | aac | gag | cgg | tta | aaa | gcg | aaa | ata | aaa | gag | tat | act | aat | tat | tgt | 720  |
| Cys | Asn | Glu | Arg | Leu | Lys | Ala | Lys | Ile | Lys | Glu | Tyr | Thr | Asn | Tyr | Cys |      |
| 225 |     |     |     |     | 230 |     |     |     |     | 235 |     |     |     |     | 240 |      |
| gta | ggg | tgg | tat | aac | aag | ggt | tta | gat | cag | ata | aga | cag | gcg | ggt | aca | 768  |
| Val | Gly | Trp | Tyr | Asn | Lys | Gly | Leu | Asp | Gln | Ile | Arg | Gln | Ala | Gly | Thr |      |
|     |     |     |     | 245 |     |     |     |     | 250 |     |     |     |     | 255 |     |      |
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| Ser | Ala | Glu | Val | Trp | Ser | Lys | Phe | Asn | Lys | Phe | Arg | Arg | Glu | Met | Thr |      |
|     |     |     | 260 |     |     |     |     | 265 |     |     |     |     | 270 |     |     |      |
| ttg | gcg | gta | ttg | gat | att | att | gct | ata | ttt | cca | act | tat | gat | ttt | gaa | 864  |
| Leu | Ala | Val | Leu | Asp | Ile | Ile | Ala | Ile | Phe | Pro | Thr | Tyr | Asp | Phe | Glu |      |
|     |     | 275 |     |     |     |     | 280 |     |     |     |     | 285 |     |     |     |      |
| aaa | tat | cca | tta | gca | aca | agt | gta | gag | tta | act | agg | gaa | att | tat | aca | 912  |
| Lys | Tyr | Pro | Leu | Ala | Thr | Ser | Val | Glu | Leu | Thr | Arg | Glu | Ile | Tyr | Thr |      |
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| gat | cca | gtg | gga | tat | tca | ggg | gga | aat | tat | ggt | tgg | gaa | cgg | ttt | ttt | 960  |
| Asp | Pro | Val | Gly | Tyr | Ser | Gly | Gly | Asn | Tyr | Gly | Trp | Glu | Arg | Phe | Phe |      |
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| Ser | Phe | Asn | Ser | Val | Glu | Ala | Asn | Gly | Thr | Arg | Gly | Pro | Gly | Leu | Val |      |
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| Thr | Trp | Leu | Gln | Ala | Ile | Asp | Ile | Tyr | Ser | His | Ser | Ile | Asn | Leu | Gln |      |
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| ctt | ggt | tat | ctt | agt | ggc | tgg | ggg | gga | act | cgt | cat | tat | gaa | gac | ttc | 1104 |
| Leu | Gly | Tyr | Leu | Ser | Gly | Trp | Gly | Gly | Thr | Arg | His | Tyr | Glu | Asp | Phe |      |
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| aca | aag | ggt | aac | ggt | gct | ttt | caa | cgt | atg | tct | gga | act | acg | agt | aat | 1152 |
| Thr | Lys | Gly | Asn | Gly | Ala | Phe | Gln | Arg | Met | Ser | Gly | Thr | Thr | Ser | Asn |      |

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| Asn Pro Arg Asn Ile Ile Phe Gly Asn Thr Asp Ile Phe Lys Ile Ile |     |     |      |
| 385   | 390 | 395 | 400  |
| tca tta gct aga tat gca atg caa ccg ttt gtt ggg tat tca atc cca |     |     | 1248 |
| Ser Leu Ala Arg Tyr Ala Met Gln Pro Phe Val Gly Tyr Ser Ile Pro |     |     |      |
|   | 405 | 410 | 415  |
| cgg cat ctt gtt tca cgt gca gaa ttt ttt ccg aca aca cta aat act |     |     | 1296 |
| Arg His Leu Val Ser Arg Ala Glu Phe Phe Pro Thr Thr Leu Asn Thr |     |     |      |
|   | 420 | 425 | 430  |
| ttc ctg tat gag gta aac agt tct ggg tac tca cag aca att gaa tct |     |     | 1344 |
| Phe Leu Tyr Glu Val Asn Ser Ser Gly Tyr Ser Gln Thr Ile Glu Ser |     |     |      |
|   | 435 | 440 | 445  |
| gtg tta cca ggt att aat aag gat cta cca cct agt cgt aca aat tac |     |     | 1392 |
| Val Leu Pro Gly Ile Asn Lys Asp Leu Pro Pro Ser Arg Thr Asn Tyr |     |     |      |
|   | 450 | 455 | 460  |
| tct cat aga tta tca aat gcg gca tgt gtt caa aat gaa acc tcc aga |     |     | 1440 |
| Ser His Arg Leu Ser Asn Ala Ala Cys Val Gln Asn Glu Thr Ser Arg |     |     |      |
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| gtt aac gta ttt ggt tgg aca cat aca agt atg aaa aaa gat aat cga |     |     | 1488 |
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|   | 485 | 490 | 495  |
| att tat cca gat aaa att acg caa att cct gca gta aaa gct ttt gcc |     |     | 1536 |
| Ile Tyr Pro Asp Lys Ile Thr Gln Ile Pro Ala Val Lys Ala Phe Ala |     |     |      |
|   | 500 | 505 | 510  |
| cta cca gca ggt aca gga tat gca gga ggt tac gtc aca gct ggg cct |     |     | 1584 |
| Leu Pro Ala Gly Thr Gly Tyr Ala Gly Gly Tyr Val Thr Ala Gly Pro |     |     |      |
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| ggg tat aca gga gga gat gta gta acg tta cct tat caa gca agt tta |     |     | 1632 |
| Gly Tyr Thr Gly Gly Asp Val Val Thr Leu Pro Tyr Gln Ala Ser Leu |     |     |      |
|   | 530 | 535 | 540  |
| aaa ata cgt tta act tct gca ccc acg aat aaa aat tac cgt gtt aga |     |     | 1680 |
| Lys Ile Arg Leu Thr Ser Ala Pro Thr Asn Lys Asn Tyr Arg Val Arg |     |     |      |
|   | 545 | 550 | 560  |
| ctt cgc tac gcg agt gga gga cct ggt ccg ttc cga gta gaa aga tgg |     |     | 1728 |
| Leu Arg Tyr Ala Ser Gly Gly Pro Gly Pro Phe Arg Val Glu Arg Trp |     |     |      |
|   | 565 | 570 | 575  |
| tcg cca agt tct gtt tca aat gct aat ttt tct cgt cca gct aca ggt |     |     | 1776 |
| Ser Pro Ser Ser Val Ser Asn Ala Asn Phe Ser Arg Pro Ala Thr Gly |     |     |      |
|   | 580 | 585 | 590  |
| ggc tat agt tca ttt gat tat gtg gac acc tta gtt act aca ttt aat |     |     | 1824 |
| Gly Tyr Ser Ser Phe Asp Tyr Val Asp Thr Leu Val Thr Thr Phe Asn |     |     |      |
|   | 595 | 600 | 605  |

|   |      |
|---|------|
| caa tca ggt gtt gaa ata att ata caa aat cta tct ggt tac cac ctt | 1872 |
| Gln Ser Gly Val Glu Ile Ile Ile Gln Asn Leu Ser Gly Tyr His Leu |      |
| 610 615 620   |      |
| att gtt gac aaa gtc gaa ttt atc cca att gac atc caa att gaa aaa | 1920 |
| Ile Val Asp Lys Val Glu Phe Ile Pro Ile Asp Ile Gln Ile Glu Lys |      |
| 625 630 635 640   |      |
| tgt acg aaa tgt caa ttc gaa gga gac ata tgt aga tgt gaa gga gta | 1968 |
| Cys Thr Lys Cys Gln Phe Glu Gly Asp Ile Cys Arg Cys Glu Gly Val |      |
| 645 650 655   |      |
| caa tcc ttg gaa aca aaa aaa gag att gta aat agt tta ttt atc aat | 2016 |
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| taa   | 2019 |
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| Pro Trp Gln Asp Thr Trp Glu Ser Val Ser Asp Ile Val Thr Ile Gly |  |
| 50 55 60  |  |
| Thr Tyr Leu Ile Gln Phe Leu Leu Glu Pro Gly Ile Gly Gly Ile Pro |  |
| 65 70 75 80   |  |
| Val Ile Phe Ser Ile Ile Asn Lys Leu Ile Pro Ser Ser Gly Gln Ser |  |
| 85 90 95  |  |
| Val Ala Ala Leu Ser Ile Cys Asp Leu Val Ser Ile Ile Arg Lys Glu |  |
| 100 105 110   |  |
| Val Asp Glu Ser Val Leu Ser Asp Gly Val Ala Asp Phe Glu Gly Glu |  |
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| Met Thr Ala Tyr Gln Asp Tyr Tyr Leu His Tyr Leu Glu Asp Trp Leu |  |
| 130 135 140   |  |
| Thr Asp Lys Ser Asn Pro Lys Lys Leu Ala Asp Val Val Lys Gln Phe |  |
| 145 150 155 160   |  |
| Gln Ala Arg Glu Glu Asp Phe Thr Lys Leu Leu Ala Gly Ser Leu Ser |  |
| 165 170 175   |  |
| Arg Gln Lys Ala Glu Ile Leu Leu Leu Pro Thr Tyr Val Gln Ala Ala |  |
| 180 185 190   |  |
| Asn Val His Leu Leu Leu Leu Arg Asp Ala Val Lys Tyr Lys Lys Glu |  |
| 195 200 205   |  |
| Trp Gly Leu Val Cys Pro Pro Leu Tyr Pro Gly Ser Gly Arg Thr Asp |  |
| 210 215 220   |  |
| Cys Asn Glu Arg Leu Lys Ala Lys Ile Lys Glu Tyr Thr Asn Tyr Cys |  |

|     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
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|     |     |     |     | 245 |     |     |     |     | 250 |     |     |     | 255 |     |
| Ser | Ala | Glu | Val | Trp | Ser | Lys | Phe | Asn | Lys | Phe | Arg | Arg | Glu | Met |
|     |     |     | 260 |     |     |     |     | 265 |     |     |     |     | 270 |     |
| Leu | Ala | Val | Leu | Asp | Ile | Ile | Ala | Ile | Phe | Pro | Thr | Tyr | Asp | Phe |
|     |     | 275 |     |     |     |     | 280 |     |     |     |     | 285 |     |     |
| Lys | Tyr | Pro | Leu | Ala | Thr | Ser | Val | Glu | Leu | Thr | Arg | Glu | Ile | Tyr |
|     | 290 |     |     |     |     | 295 |     |     |     |     | 300 |     |     |     |
| Asp | Pro | Val | Gly | Tyr | Ser | Gly | Gly | Asn | Tyr | Gly | Trp | Glu | Arg | Phe |
|     | 305 |     |     |     | 310 |     |     |     |     | 315 |     |     |     | 320 |
| Ser | Phe | Asn | Ser | Val | Glu | Ala | Asn | Gly | Thr | Arg | Gly | Pro | Gly | Leu |
|     |     |     | 325 |     |     |     |     | 330 |     |     |     |     | 335 |     |
| Thr | Trp | Leu | Gln | Ala | Ile | Asp | Ile | Tyr | Ser | His | Ser | Ile | Asn | Leu |
|     |     | 340 |     |     |     |     |     | 345 |     |     |     | 350 |     |     |
| Leu | Gly | Tyr | Leu | Ser | Gly | Trp | Gly | Gly | Thr | Arg | His | Tyr | Glu | Asp |
|     | 355 |     |     |     |     |     | 360 |     |     |     |     | 365 |     |     |
| Thr | Lys | Gly | Asn | Gly | Ala | Phe | Gln | Arg | Met | Ser | Gly | Thr | Thr | Ser |
|     | 370 |     |     |     |     | 375 |     |     |     |     | 380 |     |     |     |
| Asn | Pro | Arg | Asn | Ile | Ile | Phe | Gly | Asn | Thr | Asp | Ile | Phe | Lys | Ile |
|     | 385 |     |     | 390 |     |     |     |     |     | 395 |     |     |     | 400 |
| Ser | Leu | Ala | Arg | Tyr | Ala | Met | Gln | Pro | Phe | Val | Gly | Tyr | Ser | Ile |
|     |     |     | 405 |     |     |     |     |     | 410 |     |     |     | 415 |     |
| Arg | His | Leu | Val | Ser | Arg | Ala | Glu | Phe | Phe | Pro | Thr | Thr | Leu | Asn |
|     |     | 420 |     |     |     |     |     | 425 |     |     |     | 430 |     |     |
| Phe | Leu | Tyr | Glu | Val | Asn | Ser | Ser | Gly | Tyr | Ser | Gln | Thr | Ile | Glu |
|     | 435 |     |     |     |     |     | 440 |     |     |     |     | 445 |     |     |
| Val | Leu | Pro | Gly | Ile | Asn | Lys | Asp | Leu | Pro | Pro | Ser | Arg | Thr | Asn |
|     | 450 |     |     |     |     | 455 |     |     |     |     | 460 |     |     |     |
| Ser | His | Arg | Leu | Ser | Asn | Ala | Ala | Cys | Val | Gln | Asn | Glu | Thr | Ser |
|     | 465 |     |     |     | 470 |     |     |     |     | 475 |     |     |     | 480 |
| Val | Asn | Val | Phe | Gly | Trp | Thr | His | Thr | Ser | Met | Lys | Lys | Asp | Asn |
|     |     |     | 485 |     |     |     |     |     | 490 |     |     |     | 495 |     |
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|     |     | 500 |     |     |     |     |     | 505 |     |     |     | 510 |     |     |
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|     | 530 |     |     |     |     | 535 |     |     |     |     | 540 |     |     |     |
| Lys | Ile | Arg | Leu | Thr | Ser | Ala | Pro | Thr | Asn | Lys | Asn | Tyr | Arg | Val |
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| Leu | Arg | Tyr | Ala | Ser | Gly | Gly | Pro | Gly | Pro | Phe | Arg | Val | Glu | Arg |
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| Ser | Pro | Ser | Ser | Val | Ser | Asn | Ala | Asn | Phe | Ser | Arg | Pro | Ala | Thr |
|     |     | 580 |     |     |     |     |     | 585 |     |     |     |     | 590 |     |
| Gly | Tyr | Ser | Ser | Phe | Asp | Tyr | Val | Asp | Thr | Leu | Val | Thr | Thr | Phe |
|     | 595 |     |     |     |     |     | 600 |     |     |     |     | 605 |     |     |
| Gln | Ser | Gly | Val | Glu | Ile | Ile | Gln | Asn | Leu | Ser | Gly | Tyr | His | Leu |
|     | 610 |     |     |     |     | 615 |     |     |     |     | 620 |     |     |     |
| Ile | Val | Asp | Lys | Val | Glu | Phe | Ile | Pro | Ile | Asp | Ile | Gln | Ile | Glu |
|     | 625 |     |     |     | 630 |     |     |     |     | 635 |     |     |     | 640 |
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| Gln | Ser | Leu | Glu | Thr | Lys | Lys | Glu | Ile | Val | Asn | Ser | Leu | Phe | Ile |
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Pro Asn Asn Thr Asn Met Ser Asn Arg Tyr Pro Phe Ala Lys Asp Pro
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Asn Ile Phe Pro Ile Asn Leu Asp Ala Cys Gln Gly Arg Pro Trp Gln
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Asp Thr Trp Glu Ser Val Ser Asp Ile Val Thr Ile Gly Thr Tyr Leu
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Ile Gln Phe Leu Leu Glu Pro Gly Ile Gly Gly Ile Pro Val Ile Phe
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Ser Ile Ile Asn Lys Leu Ile Pro Ser Ser Gly Gln Ser Val Ala Ala
85 90 95

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Leu Ser Ile Cys Asp Leu Val Ser Ile Ile Arg Lys Glu Val Asp Glu
100 105 110

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Ser Val Leu Ser Asp Gly Val Ala Asp Phe Glu Gly Glu Met Thr Ala
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Tyr Gln Asp Tyr Tyr Leu His Tyr Leu Glu Asp Trp Leu Thr Asp Lys
130 135 140

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Ser Asn Pro Lys Lys Leu Ala Asp Val Val Lys Gln Phe Gln Ala Arg
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Glu Glu Asp Phe Thr Lys Leu Leu Ala Gly Ser Leu Ser Arg Gln Lys
165 170 175

gct gaa ata tta tta ttg cct acg tat gtg caa gct gca aat gtg cat 576
Ala Glu Ile Leu Leu Leu Pro Thr Tyr Val Gln Ala Ala Asn Val His
180 185 190

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| Leu Leu Leu Leu Arg Asp Ala Val Lys Tyr Lys Lys Glu Trp Gly Leu |      |
| 195 200 205   |      |
| gtg tgt cca ccg ttg tat cca ggg tca ggg aga act gat tgt aac gag | 672  |
| Val Cys Pro Pro Leu Tyr Pro Gly Ser Gly Arg Thr Asp Cys Asn Glu |      |
| 210 215 220   |      |
| cgg tta aaa gcg aaa ata aaa gag tat act aat tat tgt gta ggg tgg | 720  |
| Arg Leu Lys Ala Lys Ile Lys Glu Tyr Thr Asn Tyr Cys Val Gly Trp |      |
| 225 230 235 240   |      |
| tat aac aag ggt tta gat cag ata aga cag gcg ggt aca agt gct gaa | 768  |
| Tyr Asn Lys Gly Leu Asp Gln Ile Arg Gln Ala Gly Thr Ser Ala Glu |      |
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| gtt tgg tcg aaa ttt aat aaa ttt cgt aga gaa atg acg ttg gcg gta | 816  |
| Val Trp Ser Lys Phe Asn Lys Phe Arg Arg Glu Met Thr Leu Ala Val |      |
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| ttg gat att att gct ata ttt cca act tat gat ttt gaa aaa tat cca | 864  |
| Leu Asp Ile Ile Ala Ile Phe Pro Thr Tyr Asp Phe Glu Lys Tyr Pro |      |
| 275 280 285   |      |
| tta gca aca agt gta gag tta act agg gaa att tat aca gat cca gtg | 912  |
| Leu Ala Thr Ser Val Glu Leu Thr Arg Glu Ile Tyr Thr Asp Pro Val |      |
| 290 295 300   |      |
| gga tat tca ggg gga aat tat ggt tgg gaa cgg ttt ttt agc ttt aat | 960  |
| Gly Tyr Ser Gly Gly Asn Tyr Gly Trp Glu Arg Phe Phe Ser Phe Asn |      |
| 305 310 315 320   |      |
| tcg gta gaa gca aat gga aca cgg gga cct ggt tta gtt act tgg ctt | 1008 |
| Ser Val Glu Ala Asn Gly Thr Arg Gly Pro Gly Leu Val Thr Trp Leu |      |
| 325 330 335   |      |
| caa gct ata gat ata tat agt cat tct att aat ctt cag ctt ggt tat | 1056 |
| Gln Ala Ile Asp Ile Tyr Ser His Ser Ile Asn Leu Gln Leu Gly Tyr |      |
| 340 345 350   |      |
| ctt agt ggc tgg ggg gga act cgt cat tat gaa gac ttc aca aag ggt | 1104 |
| Leu Ser Gly Trp Gly Gly Thr Arg His Tyr Glu Asp Phe Thr Lys Gly |      |
| 355 360 365   |      |
| aac ggt gct ttt caa cgt atg tct gga act acg agt aat aat cca cgt | 1152 |
| Asn Gly Ala Phe Gln Arg Met Ser Gly Thr Thr Ser Asn Asn Pro Arg |      |
| 370 375 380   |      |
| aat att att ttt ggc aat acc gat ata ttt aaa att att tca tta gct | 1200 |
| Asn Ile Ile Phe Gly Asn Thr Asp Ile Phe Lys Ile Ile Ser Leu Ala |      |
| 385 390 395 400   |      |
| aga tat gca atg caa ccg ttt gtt ggg tat tca atc cca cgg cat ctt | 1248 |
| Arg Tyr Ala Met Gln Pro Phe Val Gly Tyr Ser Ile Pro Arg His Leu |      |
| 405 410 415   |      |



|   |      |
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| gtt tca cgt gca gaa ttt ttt ccg aca aca cta aat act ttc ctg tat | 1296 |
| Val Ser Arg Ala Glu Phe Phe Pro Thr Thr Leu Asn Thr Phe Leu Tyr |      |
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| gag gta aac agt tct ggg tac tca cag aca att gaa tct gtg tta cca | 1344 |
| Glu Val Asn Ser Ser Gly Tyr Ser Gln Thr Ile Glu Ser Val Leu Pro |      |
| 435 440 445   |      |
| ggg att aat aag gat cta cca cct agt cgt aca aat tac tct cat aga | 1392 |
| Gly Ile Asn Lys Asp Leu Pro Pro Ser Arg Thr Asn Tyr Ser His Arg |      |
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| tta tca aat gcg gca tgt gtt caa aat gaa acc tcc aga gtt aac gta | 1440 |
| Leu Ser Asn Ala Ala Cys Val Gln Asn Glu Thr Ser Arg Val Asn Val |      |
| 465 470 475 480   |      |
| ttt ggt tgg aca cat aca agt atg aaa aaa gat aat cga att tat cca | 1488 |
| Phe Gly Trp Thr His Thr Ser Met Lys Lys Asp Asn Arg Ile Tyr Pro |      |
| 485 490 495   |      |
| gat aaa att acg caa att cct gca gta aaa gct ttt gcc cta cca gca | 1536 |
| Asp Lys Ile Thr Gln Ile Pro Ala Val Lys Ala Phe Ala Leu Pro Ala |      |
| 500 505 510   |      |
| ggg aca gga tat gca gga ggt tac gtc aca gct ggg cct ggt tat aca | 1584 |
| Gly Thr Gly Tyr Ala Gly Gly Tyr Val Thr Ala Gly Pro Gly Tyr Thr |      |
| 515 520 525   |      |
| gga gga gat gta gta acg tta cct tat caa gca agt tta aaa ata cgt | 1632 |
| Gly Gly Asp Val Val Thr Leu Pro Tyr Gln Ala Ser Leu Lys Ile Arg |      |
| 530 535 540   |      |
| tta act tct gca ccc acg aat aaa aat tac cgt gtt aga ctt cgc tac | 1680 |
| Leu Thr Ser Ala Pro Thr Asn Lys Asn Tyr Arg Val Arg Leu Arg Tyr |      |
| 545 550 555 560   |      |
| gcg agt gga gga cct ggt ccg ttc cga gta gaa aga tgg tcg cca agt | 1728 |
| Ala Ser Gly Gly Pro Gly Pro Phe Arg Val Glu Arg Trp Ser Pro Ser |      |
| 565 570 575   |      |
| tct gtt tca aat gct aat ttt tct cgt cca gct aca ggt ggc tat agt | 1776 |
| Ser Val Ser Asn Ala Asn Phe Ser Arg Pro Ala Thr Gly Gly Tyr Ser |      |
| 580 585 590   |      |
| tca ttt gat tat gtg gac acc tta gtt act aca ttt aat caa tca ggt | 1824 |
| Ser Phe Asp Tyr Val Asp Thr Leu Val Thr Thr Phe Asn Gln Ser Gly |      |
| 595 600 605   |      |
| gtt gaa ata att ata caa aat cta tct ggt tac cac ctt att gtt gac | 1872 |
| Val Glu Ile Ile Ile Gln Asn Leu Ser Gly Tyr His Leu Ile Val Asp |      |
| 610 615 620   |      |
| aaa gtc gaa ttt atc cca att gac atc caa att gaa aaa tgt acg aaa | 1920 |
| Lys Val Glu Phe Ile Pro Ile Asp Ile Gln Ile Glu Lys Cys Thr Lys |      |
| 625 630 635 640   |      |
| tgt caa ttc gaa gga gac ata tgt aga tgt gaa gga gta caa tcc ttg | 1968 |

Cys Gln Phe Glu Gly Asp Ile Cys Arg Cys Glu Gly Val Gln Ser Leu  
645 650 655

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2010

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Asp Thr Trp Glu Ser Val Ser Asp Ile Val Thr Ile Gly Thr Tyr Leu  
50 55 60  
Ile Gln Phe Leu Leu Glu Pro Gly Ile Gly Gly Ile Pro Val Ile Phe  
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Ser Ile Ile Asn Lys Leu Ile Pro Ser Ser Gly Gln Ser Val Ala Ala  
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Leu Ser Ile Cys Asp Leu Val Ser Ile Ile Arg Lys Glu Val Asp Glu  
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Ser Val Leu Ser Asp Gly Val Ala Asp Phe Glu Gly Glu Met Thr Ala  
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Tyr Gln Asp Tyr Tyr Leu His Tyr Leu Glu Asp Trp Leu Thr Asp Lys  
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Ser Asn Pro Lys Lys Leu Ala Asp Val Val Lys Gln Phe Gln Ala Arg  
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Glu Glu Asp Phe Thr Lys Leu Leu Ala Gly Ser Leu Ser Arg Gln Lys  
165 170 175  
Ala Glu Ile Leu Leu Leu Pro Thr Tyr Val Gln Ala Ala Asn Val His  
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195 200 205  
Val Cys Pro Pro Leu Tyr Pro Gly Ser Gly Arg Thr Asp Cys Asn Glu  
210 215 220  
Arg Leu Lys Ala Lys Ile Lys Glu Tyr Thr Asn Tyr Cys Val Gly Trp  
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Tyr Asn Lys Gly Leu Asp Gln Ile Arg Gln Ala Gly Thr Ser Ala Glu  
245 250 255  
Val Trp Ser Lys Phe Asn Lys Phe Arg Arg Glu Met Thr Leu Ala Val  
260 265 270  
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Leu Ala Thr Ser Val Glu Leu Thr Arg Glu Ile Tyr Thr Asp Pro Val  
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Gly Tyr Ser Gly Gly Asn Tyr Gly Trp Glu Arg Phe Phe Ser Phe Asn  
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Ser Val Glu Ala Asn Gly Thr Arg Gly Pro Gly Leu Val Thr Trp Leu  
325 330 335



|     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 50  |     |     |     |     | 55  |     |     |     |     | 60  |     |     |     |     |     |
| Trp | Gly | Ile | Phe | Gly | Pro | Ser | Gln | Trp | Asp | Ala | Phe | Pro | Val | Gln | Ile |
| 65  |     |     |     |     | 70  |     |     |     |     | 75  |     |     |     | 80  |     |
| Glu | Gln | Leu | Ile | Asn | Gln | Arg | Ile | Glu | Glu | Phe | Ala | Arg | Asn | Gln | Ala |
|     |     |     |     | 85  |     |     |     |     |     | 90  |     |     |     | 95  |     |
| Ile | Ser | Arg | Leu | Glu | Gly | Leu | Ser | Asn | Leu | Tyr | Gln | Ile | Tyr | Ala | Glu |
|     |     |     | 100 |     |     |     |     | 105 |     |     |     |     | 110 |     |     |
| Ser | Phe | Arg | Glu | Trp | Glu | Ala | Asp | Pro | Thr | Asn | Pro | Ala | Leu | Arg | Glu |
|     |     | 115 |     |     |     |     | 120 |     |     |     |     | 125 |     |     |     |
| Glu | Met | Arg | Ile | Gln | Phe | Asn | Asp | Met | Asn | Ser | Ala | Leu | Thr | Thr | Ala |
|     | 130 |     |     |     |     | 135 |     |     |     |     | 140 |     |     |     |     |
| Ile | Pro | Leu | Leu | Ala | Val | Gln | Asn | Tyr | Gln | Val | Pro | Leu | Leu | Ser | Val |
| 145 |     |     |     |     | 150 |     |     |     |     | 155 |     |     |     | 160 |     |
| Tyr | Val | Gln | Ala | Ala | Asn | Leu | His | Leu | Ser | Val | Leu | Arg | Asp | Val | Ser |
|     |     |     |     | 165 |     |     |     |     | 170 |     |     |     |     | 175 |     |
| Val | Phe | Gly | Gln | Arg | Trp | Gly | Phe | Asp | Ala | Ala | Thr | Ile | Asn | Ser | Arg |
|     |     |     | 180 |     |     |     |     | 185 |     |     |     |     | 190 |     |     |
| Tyr | Asn | Asp | Leu | Thr | Arg | Leu | Ile | Gly | Asn | Tyr | Thr | Asp | Tyr | Ala | Val |
|     |     | 195 |     |     |     |     | 200 |     |     |     |     | 205 |     |     |     |
| Arg | Trp | Tyr | Asn | Thr | Gly | Leu | Glu | Arg | Val | Trp | Gly | Pro | Asp | Ser | Arg |
|     | 210 |     |     |     |     | 215 |     |     |     |     | 220 |     |     |     |     |
| Asp | Trp | Val | Arg | Tyr | Asn | Gln | Phe | Arg | Arg | Glu | Leu | Thr | Leu | Thr | Val |
| 225 |     |     |     |     | 230 |     |     |     |     | 235 |     |     |     | 240 |     |
| Leu | Asp | Ile | Val | Ala | Leu | Phe | Ser | Asn | Tyr | Asp | Ser | Arg | Arg | Tyr | Pro |
|     |     |     | 245 |     |     |     |     | 250 |     |     |     |     |     | 255 |     |
| Ile | Arg | Thr | Val | Ser | Gln | Leu | Thr | Arg | Glu | Ile | Tyr | Thr | Asn | Pro | Val |
|     |     | 260 |     |     |     |     |     | 265 |     |     |     |     | 270 |     |     |
| Leu | Glu | Asn | Phe | Asp | Gly | Ser | Phe | Arg | Gly | Met | Ala | Gln | Arg | Ile | Glu |
|     | 275 |     |     |     |     |     | 280 |     |     |     | 285 |     |     |     |     |
| Gln | Asn | Ile | Arg | Gln | Pro | His | Leu | Met | Asp | Ile | Leu | Asn | Ser | Ile | Thr |
|     | 290 |     |     |     | 295 |     |     |     |     | 300 |     |     |     |     |     |
| Ile | Tyr | Thr | Asp | Val | His | Arg | Gly | Phe | Asn | Tyr | Trp | Ser | Gly | His | Gln |
| 305 |     |     |     | 310 |     |     |     |     | 315 |     |     |     |     | 320 |     |
| Ile | Thr | Ala | Ser | Pro | Val | Gly | Phe | Ser | Gly | Pro | Glu | Phe | Ala | Phe | Pro |
|     |     |     | 325 |     |     |     |     | 330 |     |     |     |     |     | 335 |     |
| Leu | Phe | Gly | Asn | Ala | Gly | Asn | Ala | Ala | Pro | Pro | Val | Leu | Val | Ser | Leu |
|     |     | 340 |     |     |     |     | 345 |     |     |     |     | 350 |     |     |     |
| Thr | Gly | Leu | Gly | Ile | Phe | Arg | Thr | Leu | Ser | Ser | Pro | Leu | Tyr | Arg | Arg |
|     | 355 |     |     |     |     |     | 360 |     |     |     | 365 |     |     |     |     |
| Ile | Ile | Leu | Gly | Ser | Gly | Pro | Asn | Asn | Gln | Glu | Leu | Phe | Val | Leu | Asp |
|     | 370 |     |     |     | 375 |     |     |     | 380 |     |     |     |     |     |     |
| Gly | Thr | Glu | Phe | Ser | Phe | Ala | Ser | Leu | Thr | Thr | Asn | Leu | Pro | Ser | Thr |
| 385 |     |     |     | 390 |     |     |     |     | 395 |     |     |     |     | 400 |     |
| Ile | Tyr | Arg | Gln | Arg | Gly | Thr | Val | Asp | Ser | Leu | Asp | Val | Ile | Pro | Pro |
|     |     |     | 405 |     |     |     |     | 410 |     |     |     |     | 415 |     |     |
| Gln | Asp | Asn | Ser | Val | Pro | Pro | Arg | Ala | Gly | Phe | Ser | His | Arg | Leu | Ser |
|     |     | 420 |     |     |     |     | 425 |     |     |     |     | 430 |     |     |     |
| His | Val | Thr | Met | Leu | Ser | Gln | Ala | Ala | Gly | Ala | Val | Tyr | Thr | Leu | Arg |
|     | 435 |     |     |     |     | 440 |     |     |     |     | 445 |     |     |     |     |
| Ala | Pro | Thr | Phe | Ser | Trp | Gln | His | Arg | Ser | Ala | Glu | Phe | Asn | Asn | Ile |
|     | 450 |     |     |     | 455 |     |     |     | 460 |     |     |     |     |     |     |
| Ile | Pro | Ser | Ser | Gln | Ile | Thr | Gln | Ile | Pro | Leu | Thr | Lys | Ser | Thr | Asn |
| 465 |     |     |     | 470 |     |     |     |     | 475 |     |     |     |     | 480 |     |
| Leu | Gly | Ser | Gly | Thr | Ser | Val | Val | Lys | Gly | Pro | Gly | Phe | Thr | Gly | Gly |
|     |     |     | 485 |     |     |     |     | 490 |     |     |     |     | 495 |     |     |
| Asp | Ile | Leu | Arg | Arg | Thr | Ser | Pro | Gly | Gln | Ile | Ser | Thr | Leu | Arg | Val |
|     |     | 500 |     |     |     |     | 505 |     |     |     |     |     | 510 |     |     |



|      |      |      |      |     |      |      |      |      |      |      |      |      |      |      |     |
|------|------|------|------|-----|------|------|------|------|------|------|------|------|------|------|-----|
| Ile  | Lys  | Asn  | Gly  | Asp | Phe  | Asn  | Asn  | Gly  | Leu  | Ser  | Cys  | Trp  | Asn  | Val  | Lys |
|      |      |      | 980  |     |      |      |      | 985  |      |      |      |      | 990  |      |     |
| Gly  | His  | Val  | Asp  | Val | Glu  | Glu  | Gln  | Asn  | Asn  | Gln  | Arg  | Ser  | Val  | Leu  | Val |
|      |      | 995  |      |     |      |      | 1000 |      |      |      |      | 1005 |      |      |     |
| Val  | Pro  | Glu  | Trp  | Glu | Ala  | Glu  | Val  | Ser  | Gln  | Glu  | Val  | Arg  | Val  | Cys  | Pro |
|      | 1010 |      |      |     |      | 1015 |      |      |      |      | 1020 |      |      |      |     |
| Gly  | Arg  | Gly  | Tyr  | Ile | Leu  | Arg  | Val  | Thr  | Ala  | Tyr  | Lys  | Glu  | Gly  | Tyr  | Gly |
| 1025 |      |      |      |     | 1030 |      |      |      |      | 1035 |      |      |      | 1040 |     |
| Glu  | Gly  | Cys  | Val  | Thr | Ile  | His  | Glu  | Ile  | Glu  | Asn  | Asn  | Thr  | Asp  | Glu  | Leu |
|      |      |      | 1045 |     |      |      |      |      | 1050 |      |      |      |      | 1055 |     |
| Lys  | Phe  | Ser  | Asn  | Cys | Val  | Glu  | Glu  | Glu  | Ile  | Tyr  | Pro  | Asn  | Asn  | Thr  | Val |
|      |      |      | 1060 |     |      |      |      | 1065 |      |      |      |      | 1070 |      |     |
| Thr  | Cys  | Asn  | Asp  | Tyr | Thr  | Val  | Asn  | Gln  | Glu  | Glu  | Tyr  | Gly  | Gly  | Ala  | Tyr |
|      | 1075 |      |      |     |      |      | 1080 |      |      |      |      | 1085 |      |      |     |
| Thr  | Ser  | Arg  | Asn  | Arg | Gly  | Tyr  | Asn  | Glu  | Ala  | Pro  | Ser  | Val  | Pro  | Ala  | Asp |
|      | 1090 |      |      |     |      | 1095 |      |      |      |      | 1100 |      |      |      |     |
| Tyr  | Ala  | Ser  | Val  | Tyr | Glu  | Glu  | Lys  | Ser  | Tyr  | Thr  | Asp  | Gly  | Arg  | Arg  | Glu |
| 1105 |      |      |      |     | 1110 |      |      |      |      | 1115 |      |      |      | 1120 |     |
| Asn  | Pro  | Cys  | Glu  | Phe | Asn  | Arg  | Gly  | Tyr  | Arg  | Asp  | Tyr  | Thr  | Pro  | Leu  | Pro |
|      |      |      | 1125 |     |      |      |      | 1130 |      |      |      |      | 1135 |      |     |
| Val  | Gly  | Tyr  | Val  | Thr | Lys  | Glu  | Leu  | Glu  | Tyr  | Phe  | Pro  | Glu  | Thr  | Asp  | Lys |
|      |      |      | 1140 |     |      |      |      | 1145 |      |      |      | 1150 |      |      |     |
| Val  | Trp  | Ile  | Glu  | Ile | Gly  | Glu  | Thr  | Glu  | Gly  | Thr  | Phe  | Ile  | Val  | Asp  | Ser |
|      |      | 1155 |      |     |      | 1160 |      |      |      |      |      | 1165 |      |      |     |
| Val  | Glu  | Leu  | Leu  | Leu | Met  | Glu  | Glu  |      |      |      |      |      |      |      |     |
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<210> 7

<211> 1178

<212> PRT

<213> Bacillus thuringiensis

<400> 7

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| Met | Asp | Asn | Asn | Pro | Asn | Ile | Asn | Glu | Cys | Ile | Pro | Tyr | Asn | Cys | Leu |
| 1   |     |     |     | 5   |     |     |     |     | 10  |     |     |     |     | 15  |     |
| Ser | Asn | Pro | Glu | Val | Glu | Val | Leu | Gly | Gly | Glu | Arg | Ile | Glu | Thr | Gly |
|     |     | 20  |     |     |     |     |     | 25  |     |     |     | 30  |     |     |     |
| Tyr | Thr | Pro | Ile | Asp | Ile | Ser | Leu | Ser | Leu | Thr | Gln | Phe | Leu | Leu | Ser |
|     |     | 35  |     |     |     |     | 40  |     |     |     | 45  |     |     |     |     |
| Glu | Phe | Val | Pro | Gly | Ala | Gly | Phe | Val | Leu | Gly | Leu | Val | Asp | Ile | Ile |
|     | 50  |     |     |     |     | 55  |     |     |     | 60  |     |     |     |     |     |
| Trp | Gly | Ile | Phe | Gly | Pro | Ser | Gln | Trp | Asp | Ala | Phe | Leu | Val | Gln | Ile |
| 65  |     |     |     | 70  |     |     |     |     | 75  |     |     |     |     | 80  |     |
| Glu | Gln | Leu | Ile | Asn | Gln | Arg | Ile | Glu | Glu | Phe | Ala | Arg | Asn | Gln | Ala |
|     |     |     | 85  |     |     |     |     | 90  |     |     |     | 95  |     |     |     |
| Ile | Ser | Arg | Leu | Glu | Gly | Leu | Ser | Asn | Leu | Tyr | Gln | Ile | Tyr | Ala | Glu |
|     |     | 100 |     |     |     |     |     | 105 |     |     |     | 110 |     |     |     |
| Ser | Phe | Arg | Glu | Trp | Glu | Ala | Asp | Pro | Thr | Asn | Pro | Ala | Leu | Arg | Glu |
|     |     | 115 |     |     |     | 120 |     |     |     |     | 125 |     |     |     |     |
| Glu | Met | Arg | Ile | Gln | Phe | Asn | Asp | Met | Asn | Ser | Ala | Leu | Thr | Thr | Ala |
|     | 130 |     |     |     |     | 135 |     |     |     |     | 140 |     |     |     |     |
| Ile | Pro | Leu | Phe | Ala | Val | Gln | Asn | Tyr | Gln | Val | Pro | Leu | Leu | Ser | Val |
| 145 |     |     |     | 150 |     |     |     |     | 155 |     |     |     |     | 160 |     |
| Tyr | Val | Gln | Ala | Ala | Asn | Leu | His | Leu | Ser | Val | Leu | Arg | Asp | Val | Ser |
|     |     |     | 165 |     |     |     |     | 170 |     |     |     |     |     | 175 |     |

|     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |  |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|--|
| Val | Phe | Gly | Gln | Arg | Trp | Gly | Phe | Asp | Ala | Ala | Thr | Ile | Asn | Ser | Arg |  |
|     |     |     | 180 |     |     |     |     | 185 |     |     |     |     | 190 |     |     |  |
| Tyr | Asn | Asp | Leu | Thr | Arg | Leu | Ile | Gly | Asn | Tyr | Thr | Asp | Tyr | Ala | Val |  |
|     |     | 195 |     |     |     |     | 200 |     |     |     |     | 205 |     |     |     |  |
| Arg | Trp | Tyr | Asn | Thr | Gly | Leu | Glu | Arg | Val | Trp | Gly | Pro | Asp | Ser | Arg |  |
|     | 210 |     |     |     |     | 215 |     |     |     |     | 220 |     |     |     |     |  |
| Asp | Trp | Val | Arg | Tyr | Asn | Gln | Phe | Arg | Arg | Glu | Leu | Thr | Leu | Thr | Val |  |
| 225 |     |     |     |     | 230 |     |     |     |     | 235 |     |     |     |     | 240 |  |
| Leu | Asp | Ile | Val | Ala | Leu | Phe | Pro | Asn | Tyr | Asp | Ser | Arg | Arg | Tyr | Pro |  |
|     |     |     |     | 245 |     |     |     |     | 250 |     |     |     |     | 255 |     |  |
| Ile | Arg | Thr | Val | Ser | Gln | Leu | Thr | Arg | Glu | Ile | Tyr | Thr | Asn | Pro | Val |  |
|     |     |     | 260 |     |     |     |     | 265 |     |     |     |     | 270 |     |     |  |
| Leu | Glu | Asn | Phe | Asp | Gly | Ser | Phe | Arg | Gly | Ser | Ala | Gln | Gly | Ile | Glu |  |
|     |     | 275 |     |     |     |     | 280 |     |     |     |     | 285 |     |     |     |  |
| Arg | Ser | Ile | Arg | Ser | Pro | His | Leu | Met | Asp | Ile | Leu | Asn | Ser | Ile | Thr |  |
|     | 290 |     |     |     |     | 295 |     |     |     |     | 300 |     |     |     |     |  |
| Ile | Tyr | Thr | Asp | Ala | His | Arg | Gly | Tyr | Tyr | Tyr | Trp | Ser | Gly | His | Gln |  |
| 305 |     |     |     |     | 310 |     |     |     |     | 315 |     |     |     |     | 320 |  |
| Ile | Met | Ala | Ser | Pro | Val | Gly | Phe | Ser | Gly | Pro | Glu | Phe | Thr | Phe | Pro |  |
|     |     |     |     | 325 |     |     |     |     | 330 |     |     |     |     | 335 |     |  |
| Leu | Tyr | Gly | Thr | Met | Gly | Asn | Ala | Ala | Pro | Gln | Gln | Arg | Ile | Val | Ala |  |
|     |     |     | 340 |     |     |     |     | 345 |     |     |     |     | 350 |     |     |  |
| Gln | Leu | Gly | Gln | Gly | Val | Tyr | Arg | Thr | Leu | Ser | Ser | Thr | Leu | Tyr | Arg |  |
|     |     | 355 |     |     |     |     | 360 |     |     |     |     | 365 |     |     |     |  |
| Arg | Pro | Phe | Asn | Ile | Gly | Ile | Asn | Asn | Gln | Gln | Leu | Ser | Val | Leu | Asp |  |
|     | 370 |     |     |     |     | 375 |     |     |     |     | 380 |     |     |     |     |  |
| Gly | Thr | Glu | Phe | Ala | Tyr | Gly | Thr | Ser | Ser | Asn | Leu | Pro | Ser | Ala | Val |  |
| 385 |     |     |     |     | 390 |     |     |     |     | 395 |     |     |     |     | 400 |  |
| Tyr | Arg | Lys | Ser | Gly | Thr | Val | Asp | Ser | Leu | Asp | Glu | Ile | Pro | Pro | Gln |  |
|     |     |     |     | 405 |     |     |     |     | 410 |     |     |     |     | 415 |     |  |
| Asn | Asn | Asn | Val | Pro | Pro | Arg | Gln | Gly | Phe | Ser | His | Arg | Leu | Ser | His |  |
|     |     |     | 420 |     |     |     |     | 425 |     |     |     |     | 430 |     |     |  |
| Val | Ser | Met | Phe | Arg | Ser | Gly | Phe | Ser | Asn | Ser | Ser | Val | Ser | Ile | Ile |  |
|     |     | 435 |     |     |     |     | 440 |     |     |     |     | 445 |     |     |     |  |
| Arg | Ala | Pro | Met | Phe | Ser | Trp | Ile | His | Arg | Ser | Ala | Glu | Phe | Asn | Asn |  |
|     | 450 |     |     |     |     | 455 |     |     |     |     | 460 |     |     |     |     |  |
| Ile | Ile | Ala | Ser | Asp | Ser | Ile | Thr | Gln | Ile | Pro | Ala | Val | Lys | Gly | Asn |  |
| 465 |     |     |     |     | 470 |     |     |     |     | 475 |     |     |     |     | 480 |  |
| Phe | Leu | Phe | Asn | Gly | Ser | Val | Ile | Ser | Gly | Pro | Gly | Phe | Thr | Gly | Gly |  |
|     |     |     |     | 485 |     |     |     |     | 490 |     |     |     |     | 495 |     |  |
| Asp | Leu | Val | Arg | Leu | Asn | Ser | Ser | Gly | Asn | Asn | Ile | Gln | Asn | Arg | Gly |  |
|     |     |     | 500 |     |     |     |     | 505 |     |     |     |     | 510 |     |     |  |
| Tyr | Ile | Glu | Val | Pro | Ile | His | Phe | Pro | Ser | Thr | Ser | Thr | Arg | Tyr | Arg |  |
|     |     | 515 |     |     |     |     | 520 |     |     |     |     | 525 |     |     |     |  |
| Val | Arg | Val | Arg | Tyr | Ala | Ser | Val | Thr | Pro | Ile | His | Leu | Asn | Val | Asn |  |
|     | 530 |     |     |     |     | 535 |     |     |     |     | 540 |     |     |     |     |  |
| Trp | Gly | Asn | Ser | Ser | Ile | Phe | Ser | Asn | Thr | Val | Pro | Ala | Thr | Ala | Thr |  |
| 545 |     |     |     |     | 550 |     |     |     |     | 555 |     |     |     |     | 560 |  |
| Ser | Leu | Asp | Asn | Leu | Gln | Ser | Ser | Asp | Phe | Gly | Tyr | Phe | Glu | Ser | Ala |  |
|     |     |     |     | 565 |     |     |     |     | 570 |     |     |     |     | 575 |     |  |
| Asn | Ala | Phe | Thr | Ser | Ser | Leu | Gly | Asn | Ile | Val | Gly | Val | Arg | Asn | Phe |  |
|     |     |     | 580 |     |     |     |     | 585 |     |     |     |     | 590 |     |     |  |
| Ser | Gly | Thr | Ala | Gly | Val | Ile | Ile | Asp | Arg | Phe | Glu | Phe | Ile | Pro | Val |  |
|     |     | 595 |     |     |     |     | 600 |     |     |     |     | 605 |     |     |     |  |
| Thr | Ala | Thr | Leu | Glu | Ala | Glu | Tyr | Asn | Leu | Glu | Arg | Ala | Gln | Lys | Ala |  |
|     | 610 |     |     |     |     | 615 |     |     |     |     | 620 |     |     |     |     |  |
| Val | Asn | Ala | Leu | Phe | Thr | Ser | Thr | Asn | Gln | Leu | Gly | Leu | Lys | Thr | Asn |  |

|      |      |      |      |      |      |      |      |      |      |     |      |      |     |      |
|------|------|------|------|------|------|------|------|------|------|-----|------|------|-----|------|
| 625  |      |      |      |      | 630  |      |      |      |      | 635 |      |      |     | 640  |
| Val  | Thr  | Asp  | Tyr  | His  | Ile  | Asp  | Gln  | Val  | Ser  | Asn | Leu  | Val  | Thr | Tyr  |
|      |      |      |      | 645  |      |      |      |      | 650  |     |      |      |     | 655  |
| Ser  | Asp  | Glu  | Phe  | Cys  | Leu  | Asp  | Glu  | Lys  | Arg  | Glu | Leu  | Ser  | Glu | Lys  |
|      |      |      | 660  |      |      |      |      | 665  |      |     |      |      | 670 |      |
| Lys  | His  | Ala  | Lys  | Arg  | Leu  | Ser  | Asp  | Glu  | Arg  | Asn | Leu  | Leu  | Gln | Asp  |
|      |      |      | 675  |      |      |      | 680  |      |      |     |      | 685  |     | Ser  |
| Asn  | Phe  | Lys  | Asp  | Ile  | Asn  | Arg  | Gln  | Pro  | Glu  | Arg | Gly  | Trp  | Gly | Gly  |
|      | 690  |      |      |      |      | 695  |      |      |      |     | 700  |      |     | Ser  |
| Thr  | Gly  | Ile  | Thr  | Ile  | Gln  | Gly  | Gly  | Asp  | Asp  | Val | Phe  | Lys  | Glu | Asn  |
| 705  |      |      |      |      | 710  |      |      |      |      | 715 |      |      |     | 720  |
| Val  | Thr  | Leu  | Ser  | Gly  | Thr  | Phe  | Asp  | Glu  | Cys  | Tyr | Pro  | Thr  | Tyr | Leu  |
|      |      |      |      | 725  |      |      |      |      | 730  |     |      |      |     | 735  |
| Gln  | Lys  | Ile  | Asp  | Glu  | Ser  | Lys  | Leu  | Lys  | Ala  | Phe | Thr  | Arg  | Tyr | Gln  |
|      |      |      | 740  |      |      |      |      | 745  |      |     |      |      | 750 | Leu  |
| Arg  | Gly  | Tyr  | Ile  | Glu  | Asp  | Ser  | Gln  | Asp  | Leu  | Glu | Ile  | Tyr  | Leu | Ile  |
|      |      | 755  |      |      |      |      | 760  |      |      |     |      | 765  |     | Arg  |
| Tyr  | Asn  | Ala  | Lys  | His  | Glu  | Thr  | Val  | Asn  | Val  | Pro | Gly  | Thr  | Gly | Ser  |
|      | 770  |      |      |      |      | 775  |      |      |      |     | 780  |      |     | Leu  |
| Trp  | Pro  | Leu  | Ser  | Ala  | Gln  | Ser  | Pro  | Ile  | Gly  | Lys | Cys  | Gly  | Glu | Pro  |
| 785  |      |      |      |      | 790  |      |      |      |      | 795 |      |      |     | 800  |
| Arg  | Cys  | Ala  | Pro  | His  | Leu  | Glu  | Trp  | Asn  | Pro  | Asp | Leu  | Asp  | Cys | Ser  |
|      |      |      |      | 805  |      |      |      | 810  |      |     |      |      | 815 | Cys  |
| Arg  | Asp  | Gly  | Glu  | Lys  | Cys  | Ala  | His  | His  | Ser  | His | His  | Phe  | Ser | Leu  |
|      |      |      | 820  |      |      |      |      | 825  |      |     |      |      | 830 | Asp  |
| Ile  | Asp  | Val  | Gly  | Cys  | Thr  | Asp  | Leu  | Asn  | Glu  | Asp | Leu  | Gly  | Val | Trp  |
|      |      | 835  |      |      |      |      | 840  |      |      |     |      | 845  |     | Val  |
| Ile  | Phe  | Lys  | Ile  | Lys  | Thr  | Gln  | Asp  | Gly  | His  | Ala | Arg  | Leu  | Gly | Asn  |
|      | 850  |      |      |      |      | 855  |      |      |      |     | 860  |      |     | Leu  |
| Glu  | Phe  | Leu  | Glu  | Glu  | Lys  | Pro  | Leu  | Val  | Gly  | Glu | Ala  | Leu  | Ala | Arg  |
| 865  |      |      |      |      | 870  |      |      |      |      | 875 |      |      |     | 880  |
| Lys  | Arg  | Ala  | Glu  | Lys  | Trp  | Arg  | Asp  | Lys  | Arg  | Glu | Lys  | Leu  | Glu | Trp  |
|      |      |      |      | 885  |      |      |      | 890  |      |     |      |      |     | 895  |
| Glu  | Thr  | Asn  | Ile  | Val  | Tyr  | Lys  | Glu  | Ala  | Lys  | Glu | Ser  | Val  | Asp | Ala  |
|      |      | 900  |      |      |      |      | 905  |      |      |     |      |      | 910 | Leu  |
| Phe  | Val  | Asn  | Ser  | Gln  | Tyr  | Asp  | Gln  | Leu  | Gln  | Ala | Asp  | Thr  | Asn | Ile  |
|      |      | 915  |      |      |      |      | 920  |      |      |     |      | 925  |     | Ala  |
| Met  | Ile  | His  | Ala  | Ala  | Asp  | Lys  | Arg  | Val  | His  | Ser | Ile  | Arg  | Glu | Ala  |
|      | 930  |      |      |      |      | 935  |      |      |      |     | 940  |      |     | Tyr  |
| Leu  | Pro  | Glu  | Leu  | Ser  | Val  | Ile  | Pro  | Gly  | Val  | Asn | Ala  | Ala  | Ile | Phe  |
| 945  |      |      |      |      | 950  |      |      |      | 955  |     |      |      |     | 960  |
| Glu  | Leu  | Glu  | Gly  | Arg  | Ile  | Phe  | Thr  | Ala  | Phe  | Ser | Leu  | Tyr  | Asp | Ala  |
|      |      |      |      | 965  |      |      |      | 970  |      |     |      |      |     | 975  |
| Asn  | Val  | Ile  | Lys  | Asn  | Gly  | Asp  | Phe  | Asn  | Asn  | Gly | Leu  | Ser  | Cys | Trp  |
|      |      |      | 980  |      |      |      | 985  |      |      |     |      |      | 990 | Asn  |
| Val  | Lys  | Gly  | His  | Val  | Asp  | Val  | Glu  | Glu  | Gln  | Asn | Asn  | Gln  | Arg | Ser  |
|      |      | 995  |      |      |      |      | 1000 |      |      |     |      | 1005 |     | Val  |
| Leu  | Val  | Val  | Pro  | Glu  | Trp  | Glu  | Ala  | Glu  | Val  | Ser | Gln  | Glu  | Val | Arg  |
|      | 1010 |      |      |      |      | 1015 |      |      |      |     | 1020 |      |     | Val  |
| Cys  | Pro  | Gly  | Arg  | Gly  | Tyr  | Ile  | Leu  | Arg  | Val  | Thr | Ala  | Tyr  | Lys | Glu  |
| 1025 |      |      |      |      | 1030 |      |      |      | 1035 |     |      |      |     | 1040 |
| Tyr  | Gly  | Glu  | Gly  | Cys  | Val  | Thr  | Ile  | His  | Glu  | Ile | Glu  | Asn  | Asn | Thr  |
|      |      |      |      | 1045 |      |      |      |      | 1050 |     |      |      |     | 1055 |
| Glu  | Leu  | Lys  | Phe  | Ser  | Asn  | Cys  | Val  | Glu  | Glu  | Glu | Ile  | Tyr  | Pro | Asn  |
|      |      |      | 1060 |      |      |      |      | 1065 |      |     |      | 1070 |     | Asn  |
| Thr  | Val  | Thr  | Cys  | Asn  | Asp  | Tyr  | Thr  | Val  | Asn  | Gln | Glu  | Glu  | Tyr | Gly  |
|      |      | 1075 |      |      |      |      | 1080 |      |      |     |      | 1085 |     | Gly  |



|      |     |      |      |      |      |      |      |      |      |      |     |     |      |     |      |  |
|------|-----|------|------|------|------|------|------|------|------|------|-----|-----|------|-----|------|--|
| Ala  | Tyr | Thr  | Ser  | Arg  | Asn  | Arg  | Gly  | Tyr  | Asn  | Glu  | Ala | Pro | Ser  | Val | Pro  |  |
| 1090 |     |      |      |      |      | 1095 |      |      |      | 1100 |     |     |      |     |      |  |
| Ala  | Asp | Tyr  | Ala  | Ser  | Val  | Tyr  | Glu  | Glu  | Lys  | Ser  | Tyr | Thr | Asp  | Gly | Arg  |  |
| 1105 |     |      |      |      | 1110 |      |      |      |      | 1115 |     |     |      |     | 1120 |  |
| Arg  | Glu | Asn  | Pro  | Cys  | Glu  | Phe  | Asn  | Arg  | Gly  | Tyr  | Arg | Asp | Tyr  | Thr | Pro  |  |
|      |     |      |      | 1125 |      |      |      |      | 1130 |      |     |     |      |     | 1135 |  |
| Leu  | Pro | Val  | Gly  | Tyr  | Val  | Thr  | Lys  | Glu  | Leu  | Glu  | Tyr | Phe | Pro  | Glu | Thr  |  |
|      |     |      | 1140 |      |      |      |      | 1145 |      |      |     |     | 1150 |     |      |  |
| Asp  | Lys | Val  | Trp  | Ile  | Glu  | Ile  | Gly  | Glu  | Thr  | Glu  | Gly | Thr | Phe  | Ile | Val  |  |
|      |     | 1155 |      |      |      |      | 1160 |      |      |      |     |     | 1165 |     |      |  |
| Asp  | Ser | Val  | Glu  | Leu  | Leu  | Leu  | Met  | Glu  | Glu  |      |     |     |      |     |      |  |
|      |     | 1170 |      |      |      |      | 1175 |      |      |      |     |     |      |     |      |  |

<210> 8

<211> 719

<212> PRT

<213> Bacillus thuringiensis

<400> 8

|     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |  |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|--|
| Met | Lys | Leu | Lys | Asn | Gln | Asp | Lys | His | Gln | Ser | Phe | Ser | Ser | Asn | Ala |  |
| 1   |     |     |     | 5   |     |     |     |     | 10  |     |     |     |     | 15  |     |  |
| Lys | Val | Asp | Lys | Ile | Ser | Thr | Asp | Ser | Leu | Lys | Asn | Glu | Thr | Asp | Ile |  |
|     |     |     | 20  |     |     |     |     | 25  |     |     |     |     | 30  |     |     |  |
| Glu | Leu | Gln | Asn | Ile | Asn | His | Glu | Asp | Cys | Leu | Lys | Met | Ser | Glu | Tyr |  |
|     |     | 35  |     |     |     |     | 40  |     |     |     |     | 45  |     |     |     |  |
| Glu | Asn | Val | Glu | Pro | Phe | Val | Ser | Ala | Ser | Thr | Ile | Gln | Thr | Gly | Ile |  |
|     | 50  |     |     |     |     | 55  |     |     |     |     | 60  |     |     |     |     |  |
| Gly | Ile | Ala | Gly | Lys | Ile | Leu | Gly | Thr | Leu | Gly | Val | Pro | Phe | Ala | Gly |  |
| 65  |     |     |     | 70  |     |     |     |     | 75  |     |     |     |     |     | 80  |  |
| Gln | Val | Ala | Ser | Leu | Tyr | Ser | Phe | Ile | Leu | Gly | Glu | Leu | Trp | Pro | Lys |  |
|     |     |     |     | 85  |     |     |     |     | 90  |     |     |     |     | 95  |     |  |
| Gly | Lys | Asn | Gln | Trp | Glu | Ile | Phe | Met | Glu | His | Val | Glu | Glu | Ile | Ile |  |
|     |     |     | 100 |     |     |     |     | 105 |     |     |     |     | 110 |     |     |  |
| Asn | Gln | Lys | Ile | Ser | Thr | Tyr | Ala | Arg | Asn | Lys | Ala | Leu | Thr | Asp | Leu |  |
|     |     | 115 |     |     |     |     | 120 |     |     |     |     | 125 |     |     |     |  |
| Lys | Gly | Leu | Gly | Asp | Ala | Leu | Ala | Val | Tyr | His | Asp | Ser | Leu | Glu | Ser |  |
|     | 130 |     |     |     |     | 135 |     |     |     |     | 140 |     |     |     |     |  |
| Trp | Val | Gly | Asn | Arg | Asn | Asn | Thr | Arg | Ala | Arg | Ser | Val | Val | Lys | Ser |  |
| 145 |     |     |     | 150 |     |     |     |     | 155 |     |     |     |     | 160 |     |  |
| Gln | Tyr | Ile | Ala | Leu | Glu | Leu | Met | Phe | Val | Gln | Lys | Leu | Pro | Ser | Phe |  |
|     |     |     |     | 165 |     |     |     | 170 |     |     |     |     |     | 175 |     |  |
| Ala | Val | Ser | Gly | Glu | Glu | Val | Pro | Leu | Leu | Pro | Ile | Tyr | Ala | Gln | Ala |  |
|     |     |     | 180 |     |     |     |     | 185 |     |     |     |     | 190 |     |     |  |
| Ala | Asn | Leu | His | Leu | Leu | Leu | Leu | Arg | Asp | Ala | Ser | Ile | Phe | Gly | Lys |  |
|     |     | 195 |     |     |     |     | 200 |     |     |     |     | 205 |     |     |     |  |
| Glu | Trp | Gly | Leu | Ser | Ser | Ser | Glu | Ile | Ser | Thr | Phe | Tyr | Asn | Arg | Gln |  |
|     | 210 |     |     |     |     | 215 |     |     |     |     | 220 |     |     |     |     |  |
| Val | Glu | Arg | Ala | Gly | Asp | Tyr | Ser | Asp | His | Cys | Val | Lys | Trp | Tyr | Ser |  |
| 225 |     |     |     | 230 |     |     |     |     | 235 |     |     |     |     | 240 |     |  |
| Thr | Gly | Leu | Asn | Asn | Leu | Arg | Gly | Thr | Asn | Ala | Glu | Ser | Trp | Val | Arg |  |
|     |     |     |     | 245 |     |     |     | 250 |     |     |     |     |     | 255 |     |  |
| Tyr | Asn | Gln | Phe | Arg | Arg | Asp | Met | Thr | Leu | Met | Val | Leu | Asp | Leu | Val |  |
|     |     | 260 |     |     |     |     | 265 |     |     |     |     |     | 270 |     |     |  |
| Ala | Leu | Phe | Pro | Ser | Tyr | Asp | Thr | Gln | Met | Tyr | Pro | Ile | Lys | Thr | Thr |  |
|     |     | 275 |     |     |     |     | 280 |     |     |     |     | 285 |     |     |     |  |
| Ala | Gln | Leu | Thr | Arg | Glu | Val | Tyr | Thr | Asp | Ala | Ile | Gly | Thr | Val | His |  |

|   |  |     |  |     |
|---|--|-----|--|-----|
| 290   |  | 295 |  | 300 |
| Pro His Pro Ser Phe Thr Ser Thr Thr Trp Tyr Asn Asn Asn Ala Pro |  |     |  |     |
| 305   |  | 310 |  | 315 |
| Ser Phe Ser Ala Ile Glu Ala Ala Val Val Arg Asn Pro His Leu Leu |  |     |  |     |
|   |  | 325 |  | 330 |
| Asp Phe Leu Glu Gln Val Thr Ile Tyr Ser Leu Leu Ser Arg Trp Ser |  |     |  |     |
|   |  | 340 |  | 345 |
| Asn Thr Gln Tyr Met Asn Met Trp Gly Gly His Lys Leu Glu Phe Arg |  |     |  |     |
|   |  | 355 |  | 360 |
| Thr Ile Gly Gly Thr Leu Asn Ile Ser Thr Gln Gly Ser Thr Asn Thr |  |     |  |     |
|   |  | 370 |  | 375 |
| Ser Ile Asn Pro Val Thr Leu Pro Phe Thr Ser Arg Asp Val Tyr Arg |  |     |  |     |
| 385   |  | 390 |  | 395 |
| Thr Glu Ser Leu Ala Gly Leu Asn Leu Phe Leu Thr Gln Pro Val Asn |  |     |  |     |
|   |  | 405 |  | 410 |
| Gly Val Pro Arg Val Asp Phe His Trp Lys Phe Val Thr His Pro Ile |  |     |  |     |
|   |  | 420 |  | 425 |
| Ala Ser Asp Asn Phe Tyr Tyr Pro Gly Tyr Ala Gly Ile Gly Thr Gln |  |     |  |     |
|   |  | 435 |  | 440 |
| Leu Gln Asp Ser Glu Asn Glu Leu Pro Pro Glu Ala Thr Gly Gln Pro |  |     |  |     |
|   |  | 450 |  | 455 |
| Asn Tyr Glu Ser Tyr Ser His Arg Leu Ser His Ile Gly Leu Ile Ser |  |     |  |     |
| 465   |  | 470 |  | 475 |
| Ala Ser His Val Lys Ala Leu Val Tyr Ser Trp Thr His Arg Ser Ala |  |     |  |     |
|   |  | 485 |  | 490 |
| Asp Arg Thr Asn Thr Ile Glu Pro Asn Ser Ile Thr Gln Ile Pro Leu |  |     |  |     |
|   |  | 500 |  | 505 |
| Val Lys Ala Phe Asn Leu Ser Ser Gly Ala Ala Val Val Arg Gly Pro |  |     |  |     |
|   |  | 515 |  | 520 |
| Gly Phe Thr Gly Gly Asp Ile Leu Arg Arg Thr Asn Thr Gly Thr Phe |  |     |  |     |
|   |  | 530 |  | 535 |
| Gly Asp Ile Arg Val Asn Ile Asn Pro Pro Phe Ala Gln Arg Tyr Arg |  |     |  |     |
| 545   |  | 550 |  | 555 |
| Val Arg Ile Arg Tyr Ala Ser Thr Thr Asp Leu Gln Phe His Thr Ser |  |     |  |     |
|   |  | 565 |  | 570 |
| Ile Asn Gly Lys Ala Ile Asn Gln Gly Asn Phe Ser Ala Thr Met Asn |  |     |  |     |
|   |  | 580 |  | 585 |
| Arg Gly Glu Asp Leu Asp Tyr Lys Thr Phe Arg Thr Val Gly Phe Thr |  |     |  |     |
|   |  | 595 |  | 600 |
| Thr Pro Phe Ser Phe Leu Asp Val Gln Ser Thr Phe Thr Ile Gly Ala |  |     |  |     |
|   |  | 610 |  | 615 |
| Trp Asn Phe Ser Ser Gly Asn Glu Val Tyr Ile Asp Arg Ile Glu Phe |  |     |  |     |
| 625   |  | 630 |  | 635 |
| Val Pro Val Glu Val Thr Tyr Glu Ala Glu Tyr Asp Phe Glu Lys Ala |  |     |  |     |
|   |  | 645 |  | 650 |
| Gln Glu Lys Val Thr Ala Leu Phe Thr Ser Thr Asn Pro Arg Gly Leu |  |     |  |     |
|   |  | 660 |  | 665 |
| Lys Thr Asp Val Lys Asp Tyr His Ile Asp Gln Val Ser Asn Leu Val |  |     |  |     |
|   |  | 675 |  | 680 |
| Glu Ser Leu Ser Asp Glu Phe Tyr Leu Asp Glu Lys Arg Glu Leu Phe |  |     |  |     |
|   |  | 690 |  | 695 |
| Glu Ile Val Lys Tyr Ala Lys Gln Leu His Ile Glu Arg Asn Met     |  |     |  |     |
| 705   |  | 710 |  | 715 |

<210> 9  
<211> 633

<212> PRT

<213> *Bacillus thuringiensis*

<400> 9

|     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Met | Asn | Asn | Val | Leu | Asn | Ser | Gly | Arg | Thr | Thr | Ile | Cys | Asp | Ala | Tyr |
| 1   |     |     |     | 5   |     |     |     |     | 10  |     |     |     |     | 15  |     |
| Asn | Val | Val | Ala | His | Asp | Pro | Phe | Ser | Phe | Glu | His | Lys | Ser | Leu | Asp |
|     |     | 20  |     |     |     |     | 25  |     |     |     |     | 30  |     |     |     |
| Thr | Ile | Gln | Lys | Glu | Trp | Met | Glu | Trp | Lys | Arg | Thr | Asp | His | Ser | Leu |
|     | 35  |     |     |     |     | 40  |     |     |     |     | 45  |     |     |     |     |
| Tyr | Val | Ala | Pro | Val | Val | Gly | Thr | Val | Ser | Ser | Phe | Leu | Leu | Lys | Lys |
|     | 50  |     |     |     |     | 55  |     |     |     |     | 60  |     |     |     |     |
| Val | Gly | Ser | Leu | Ile | Gly | Lys | Arg | Ile | Leu | Ser | Glu | Leu | Trp | Gly | Ile |
| 65  |     |     |     | 70  |     |     |     |     | 75  |     |     |     |     | 80  |     |
| Ile | Phe | Pro | Ser | Gly | Ser | Thr | Asn | Leu | Met | Gln | Asp | Ile | Leu | Arg | Glu |
|     |     |     | 85  |     |     |     |     |     | 90  |     |     |     |     | 95  |     |
| Thr | Glu | Gln | Phe | Leu | Asn | Gln | Arg | Leu | Asn | Thr | Asp | Thr | Leu | Ala | Arg |
|     |     | 100 |     |     |     |     |     | 105 |     |     |     |     | 110 |     |     |
| Val | Asn | Ala | Glu | Leu | Ile | Gly | Leu | Gln | Ala | Asn | Ile | Arg | Glu | Phe | Asn |
|     | 115 |     |     |     |     |     | 120 |     |     |     |     | 125 |     |     |     |
| Gln | Gln | Val | Asp | Asn | Phe | Leu | Asn | Pro | Thr | Gln | Asn | Pro | Val | Pro | Leu |
|     | 130 |     |     |     |     | 135 |     |     |     |     | 140 |     |     |     |     |
| Ser | Ile | Thr | Ser | Ser | Val | Asn | Thr | Met | Gln | Gln | Leu | Phe | Leu | Asn | Arg |
| 145 |     |     |     |     | 150 |     |     |     | 155 |     |     |     |     | 160 |     |
| Leu | Pro | Gln | Phe | Gln | Ile | Gln | Gly | Tyr | Gln | Leu | Leu | Leu | Leu | Pro | Leu |
|     |     |     | 165 |     |     |     |     | 170 |     |     |     |     |     | 175 |     |
| Phe | Ala | Gln | Ala | Ala | Asn | Met | His | Leu | Ser | Phe | Ile | Arg | Asp | Val | Ile |
|     |     | 180 |     |     |     |     |     | 185 |     |     |     |     | 190 |     |     |
| Leu | Asn | Ala | Asp | Glu | Trp | Gly | Ile | Ser | Ala | Ala | Thr | Leu | Arg | Thr | Tyr |
|     | 195 |     |     |     |     | 200 |     |     |     |     | 205 |     |     |     |     |
| Arg | Asp | Tyr | Leu | Arg | Asn | Tyr | Thr | Arg | Asp | Tyr | Ser | Asn | Tyr | Cys | Ile |
|     | 210 |     |     |     | 215 |     |     |     |     |     | 220 |     |     |     |     |
| Asn | Thr | Tyr | Gln | Thr | Ala | Phe | Arg | Gly | Leu | Asn | Thr | Arg | Leu | His | Asp |
| 225 |     |     |     | 230 |     |     |     |     | 235 |     |     |     |     | 240 |     |
| Met | Leu | Glu | Phe | Arg | Thr | Tyr | Met | Phe | Leu | Asn | Val | Phe | Glu | Tyr | Val |
|     |     |     | 245 |     |     |     |     | 250 |     |     |     |     | 255 |     |     |
| Ser | Ile | Trp | Ser | Leu | Phe | Lys | Tyr | Gln | Ser | Leu | Met | Val | Ser | Ser | Gly |
|     |     | 260 |     |     |     |     |     | 265 |     |     |     | 270 |     |     |     |
| Ala | Asn | Leu | Tyr | Ala | Ser | Gly | Ser | Gly | Pro | Gln | Gln | Thr | Gln | Ser | Phe |
|     | 275 |     |     |     |     | 280 |     |     |     |     | 285 |     |     |     |     |
| Thr | Ala | Gln | Asn | Trp | Pro | Phe | Leu | Tyr | Ser | Leu | Phe | Gln | Val | Asn | Ser |
|     | 290 |     |     |     |     | 295 |     |     |     |     | 300 |     |     |     |     |
| Asn | Tyr | Ile | Leu | Ser | Gly | Ile | Ser | Gly | Thr | Arg | Leu | Ser | Ile | Thr | Phe |
| 305 |     |     |     | 310 |     |     |     |     | 315 |     |     |     |     | 320 |     |
| Pro | Asn | Ile | Gly | Gly | Leu | Pro | Gly | Ser | Thr | Thr | Thr | His | Ser | Leu | Asn |
|     |     |     | 325 |     |     |     |     | 330 |     |     |     |     | 335 |     |     |
| Ser | Ala | Arg | Val | Asn | Tyr | Ser | Gly | Gly | Val | Ser | Ser | Gly | Leu | Ile | Gly |
|     |     | 340 |     |     |     |     |     | 345 |     |     |     | 350 |     |     |     |
| Ala | Thr | Asn | Leu | Asn | His | Asn | Phe | Asn | Cys | Ser | Thr | Val | Leu | Pro | Pro |
|     | 355 |     |     |     |     | 360 |     |     |     |     | 365 |     |     |     |     |
| Leu | Ser | Thr | Pro | Phe | Val | Arg | Ser | Trp | Leu | Asp | Ser | Gly | Thr | Asp | Arg |
|     | 370 |     |     |     |     | 375 |     |     |     |     | 380 |     |     |     |     |
| Glu | Gly | Val | Ala | Thr | Ser | Thr | Asn | Trp | Gln | Thr | Glu | Ser | Phe | Gln | Thr |
| 385 |     |     |     | 390 |     |     |     |     | 395 |     |     |     |     | 400 |     |
| Thr | Leu | Ser | Leu | Arg | Cys | Gly | Ala | Phe | Ser | Ala | Arg | Gly | Asn | Ser | Asn |
|     |     |     | 405 |     |     |     |     | 410 |     |     |     | 415 |     |     |     |
| Tyr | Phe | Pro | Asp | Tyr | Phe | Ile | Arg | Asn | Ile | Ser | Gly | Val | Pro | Leu | Val |

|     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Ile | Arg | Asn | Glu | Asp | Leu | Thr | Arg | Pro | Leu | His | Tyr | Asn | Gln | Ile | Arg |
|     |     | 435 |     |     |     |     | 440 |     |     |     |     | 445 |     |     |     |
| Asn | Ile | Glu | Ser | Pro | Ser | Gly | Thr | Pro | Gly | Gly | Ala | Arg | Ala | Tyr | Leu |
|     |     | 450 |     |     |     |     | 455 |     |     |     | 460 |     |     |     |     |
| Val | Ser | Val | His | Asn | Arg | Lys | Asn | Asn | Ile | Tyr | Ala | Ala | Asn | Glu | Asn |
| 465 |     |     |     |     | 470 |     |     |     |     | 475 |     |     |     | 480 |     |
| Gly | Thr | Met | Ile | His | Leu | Ala | Pro | Glu | Asp | Tyr | Thr | Gly | Phe | Thr | Ile |
|     |     |     |     | 485 |     |     |     |     | 490 |     |     |     |     | 495 |     |
| Ser | Pro | Ile | His | Ala | Thr | Gln | Val | Asn | Asn | Gln | Thr | Arg | Thr | Phe | Ile |
|     |     |     | 500 |     |     |     |     | 505 |     |     |     |     | 510 |     |     |
| Ser | Glu | Lys | Phe | Gly | Asn | Gln | Gly | Asp | Ser | Leu | Arg | Phe | Glu | Gln | Ser |
|     |     | 515 |     |     |     |     | 520 |     |     |     |     | 525 |     |     |     |
| Asn | Thr | Thr | Ala | Arg | Tyr | Thr | Leu | Arg | Gly | Asn | Gly | Asn | Ser | Tyr | Asn |
|     |     | 530 |     |     |     | 535 |     |     |     |     | 540 |     |     |     |     |
| Leu | Tyr | Leu | Arg | Val | Ser | Ser | Ile | Gly | Asn | Ser | Thr | Ile | Arg | Val | Thr |
| 545 |     |     |     |     | 550 |     |     |     |     | 555 |     |     |     | 560 |     |
| Ile | Asn | Gly | Arg | Val | Tyr | Thr | Val | Ser | Asn | Val | Asn | Thr | Thr | Thr | Asn |
|     |     |     |     | 565 |     |     |     |     | 570 |     |     |     |     | 575 |     |
| Asn | Asp | Gly | Val | Asn | Asp | Asn | Gly | Ala | Arg | Phe | Ser | Asp | Ile | Asn | Ile |
|     |     |     | 580 |     |     |     |     | 585 |     |     |     |     | 590 |     |     |
| Gly | Asn | Ile | Val | Ala | Ser | Asp | Asn | Thr | Asn | Val | Thr | Leu | Asp | Ile | Asn |
|     |     | 595 |     |     |     |     | 600 |     |     |     |     | 605 |     |     |     |
| Val | Thr | Leu | Asn | Ser | Gly | Thr | Pro | Phe | Asp | Leu | Met | Asn | Ile | Met | Phe |
|     |     | 610 |     |     |     | 615 |     |     |     |     | 620 |     |     |     |     |
| Val | Pro | Thr | Asn | Leu | Pro | Pro | Leu | Tyr |     |     |     |     |     |     |     |
| 625 |     |     |     |     | 630 |     |     |     |     |     |     |     |     |     |     |

<210> 10

<211> 652

<212> PRT

<213> Bacillus thuringiensis

<400> 10

|     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Met | Ile | Arg | Lys | Gly | Gly | Arg | Lys | Met | Asn | Pro | Asn | Asn | Arg | Ser | Glu |
| 1   |     |     |     | 5   |     |     |     |     | 10  |     |     |     |     | 15  |     |
| His | Asp | Thr | Ile | Lys | Thr | Thr | Glu | Asn | Asn | Glu | Val | Pro | Thr | Asn | His |
|     |     |     | 20  |     |     |     |     | 25  |     |     |     |     | 30  |     |     |
| Val | Gln | Tyr | Pro | Leu | Ala | Glu | Thr | Pro | Asn | Pro | Thr | Leu | Glu | Asp | Leu |
|     |     | 35  |     |     |     |     | 40  |     |     |     |     | 45  |     |     |     |
| Asn | Tyr | Lys | Glu | Phe | Leu | Arg | Met | Thr | Ala | Asp | Asn | Asn | Thr | Glu | Ala |
|     | 50  |     |     |     |     | 55  |     |     |     | 60  |     |     |     |     |     |
| Leu | Asp | Ser | Ser | Thr | Thr | Lys | Asp | Val | Ile | Gln | Lys | Gly | Ile | Ser | Val |
| 65  |     |     |     |     | 70  |     |     |     |     | 75  |     |     |     | 80  |     |
| Val | Gly | Asp | Leu | Leu | Gly | Val | Val | Gly | Phe | Pro | Phe | Gly | Gly | Ala | Leu |
|     |     |     | 85  |     |     |     |     | 90  |     |     |     |     |     | 95  |     |
| Val | Ser | Phe | Tyr | Thr | Asn | Phe | Leu | Asn | Thr | Ile | Trp | Pro | Ser | Glu | Asp |
|     |     | 100 |     |     |     |     |     | 105 |     |     |     |     | 110 |     |     |
| Pro | Trp | Lys | Ala | Phe | Met | Glu | Gln | Val | Glu | Ala | Leu | Met | Asp | Gln | Lys |
|     |     | 115 |     |     |     |     | 120 |     |     |     |     | 125 |     |     |     |
| Ile | Ala | Asp | Tyr | Ala | Lys | Asn | Lys | Ala | Leu | Ala | Glu | Leu | Gln | Gly | Leu |
|     | 130 |     |     |     |     | 135 |     |     |     |     | 140 |     |     |     |     |
| Gln | Asn | Asn | Val | Glu | Asp | Tyr | Val | Ser | Ala | Leu | Ser | Ser | Trp | Gln | Lys |
| 145 |     |     |     |     | 150 |     |     |     |     | 155 |     |     |     | 160 |     |
| Asn | Pro | Val | Ser | Ser | Arg | Asn | Pro | His | Ser | Gln | Gly | Arg | Ile | Arg | Glu |
|     |     |     |     | 165 |     |     |     |     | 170 |     |     |     |     | 175 |     |

|     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Leu | Phe | Ser | Gln | Ala | Glu | Ser | His | Phe | Arg | Asn | Ser | Met | Pro | Ser | Phe |
|     |     |     | 180 |     |     |     |     | 185 |     |     |     |     | 190 |     |     |
| Ala | Ile | Ser | Gly | Tyr | Glu | Val | Leu | Phe | Leu | Thr | Thr | Tyr | Ala | Gln | Ala |
|     |     | 195 |     |     |     |     | 200 |     |     |     |     | 205 |     |     |     |
| Ala | Asn | Thr | His | Leu | Phe | Leu | Leu | Lys | Asp | Ala | Gln | Ile | Tyr | Gly | Glu |
|     | 210 |     |     |     |     | 215 |     |     |     |     | 220 |     |     |     |     |
| Glu | Trp | Gly | Tyr | Glu | Lys | Glu | Asp | Ile | Ala | Glu | Phe | Tyr | Lys | Arg | Gln |
| 225 |     |     |     |     | 230 |     |     |     |     | 235 |     |     |     |     | 240 |
| Leu | Lys | Leu | Thr | Gln | Glu | Tyr | Thr | Asp | His | Cys | Val | Lys | Trp | Tyr | Asn |
|     |     |     | 245 |     |     |     |     | 250 |     |     |     |     |     | 255 |     |
| Val | Gly | Leu | Asp | Lys | Leu | Arg | Gly | Ser | Ser | Tyr | Glu | Ser | Trp | Val | Asn |
|     |     | 260 |     |     |     |     |     | 265 |     |     |     |     | 270 |     |     |
| Phe | Asn | Arg | Tyr | Arg | Arg | Glu | Met | Thr | Leu | Thr | Val | Leu | Asp | Leu | Ile |
|     | 275 |     |     |     |     |     | 280 |     |     |     |     | 285 |     |     |     |
| Ala | Leu | Phe | Pro | Leu | Tyr | Asp | Val | Arg | Leu | Tyr | Pro | Lys | Glu | Val | Lys |
|     | 290 |     |     |     |     | 295 |     |     |     |     | 300 |     |     |     |     |
| Thr | Glu | Leu | Thr | Arg | Asp | Val | Leu | Thr | Asp | Pro | Ile | Val | Gly | Val | Asn |
| 305 |     |     |     |     | 310 |     |     |     |     | 315 |     |     |     |     | 320 |
| Asn | Leu | Arg | Gly | Tyr | Gly | Thr | Thr | Phe | Ser | Asn | Ile | Glu | Asn | Tyr | Ile |
|     |     |     | 325 |     |     |     |     | 330 |     |     |     |     |     | 335 |     |
| Arg | Lys | Pro | His | Leu | Phe | Asp | Tyr | Leu | His | Arg | Ile | Gln | Phe | His | Thr |
|     |     | 340 |     |     |     |     |     | 345 |     |     |     |     | 350 |     |     |
| Arg | Phe | Gln | Pro | Gly | Tyr | Tyr | Gly | Asn | Asp | Ser | Phe | Asn | Tyr | Trp | Ser |
|     | 355 |     |     |     |     |     | 360 |     |     |     |     | 365 |     |     |     |
| Gly | Asn | Tyr | Val | Ser | Thr | Arg | Pro | Ser | Ile | Gly | Ser | Asn | Asp | Ile | Ile |
|     | 370 |     |     |     |     | 375 |     |     |     |     | 380 |     |     |     |     |
| Thr | Ser | Pro | Phe | Tyr | Gly | Asn | Lys | Ser | Ser | Glu | Pro | Val | Gln | Asn | Leu |
| 385 |     |     |     |     | 390 |     |     |     |     | 395 |     |     |     |     | 400 |
| Glu | Phe | Asn | Gly | Glu | Lys | Val | Tyr | Arg | Ala | Val | Ala | Asn | Thr | Asn | Leu |
|     |     |     | 405 |     |     |     |     |     | 410 |     |     |     |     | 415 |     |
| Ala | Val | Trp | Pro | Ser | Ala | Val | Tyr | Ser | Gly | Val | Thr | Lys | Val | Glu | Phe |
|     |     | 420 |     |     |     |     |     | 425 |     |     |     |     | 430 |     |     |
| Ser | Gln | Tyr | Asn | Asp | Gln | Thr | Asp | Glu | Ala | Ser | Thr | Gln | Thr | Tyr | Asp |
|     | 435 |     |     |     |     |     | 440 |     |     |     |     | 445 |     |     |     |
| Ser | Lys | Arg | Asn | Val | Gly | Ala | Val | Ser | Trp | Asp | Ser | Ile | Asp | Gln | Leu |
|     | 450 |     |     |     |     | 455 |     |     |     |     | 460 |     |     |     |     |
| Pro | Pro | Glu | Thr | Thr | Asp | Glu | Pro | Leu | Glu | Lys | Gly | Tyr | Ser | His | Gln |
| 465 |     |     |     |     | 470 |     |     |     |     | 475 |     |     |     |     | 480 |
| Leu | Asn | Tyr | Val | Met | Cys | Phe | Leu | Met | Gln | Gly | Ser | Arg | Gly | Thr | Ile |
|     |     |     | 485 |     |     |     |     |     | 490 |     |     |     |     | 495 |     |
| Pro | Val | Leu | Thr | Trp | Thr | His | Lys | Ser | Val | Asp | Phe | Phe | Asn | Met | Ile |
|     |     | 500 |     |     |     |     |     | 505 |     |     |     |     | 510 |     |     |
| Asp | Ser | Lys | Lys | Ile | Thr | Gln | Leu | Pro | Leu | Val | Lys | Ala | Tyr | Lys | Leu |
|     | 515 |     |     |     |     |     | 520 |     |     |     |     | 525 |     |     |     |
| Gln | Ser | Gly | Ala | Ser | Val | Val | Ala | Gly | Pro | Arg | Phe | Thr | Gly | Gly | Asp |
|     | 530 |     |     |     |     | 535 |     |     |     |     | 540 |     |     |     |     |
| Ile | Ile | Gln | Cys | Thr | Glu | Asn | Gly | Ser | Ala | Ala | Thr | Ile | Tyr | Val | Thr |
| 545 |     |     |     |     | 550 |     |     |     |     | 555 |     |     |     |     | 560 |
| Pro | Asp | Val | Ser | Tyr | Ser | Gln | Lys | Tyr | Arg | Ala | Arg | Ile | His | Tyr | Ala |
|     |     |     | 565 |     |     |     |     |     | 570 |     |     |     |     | 575 |     |
| Ser | Thr | Ser | Gln | Ile | Thr | Phe | Thr | Leu | Ser | Leu | Asp | Gly | Ala | Pro | Phe |
|     |     | 580 |     |     |     |     |     | 585 |     |     |     |     | 590 |     |     |
| Asn | Gln | Tyr | Tyr | Phe | Asp | Lys | Thr | Ile | Asn | Lys | Gly | Asp | Thr | Leu | Thr |
|     | 595 |     |     |     |     |     | 600 |     |     |     |     | 605 |     |     |     |
| Tyr | Asn | Ser | Phe | Asn | Leu | Ala | Ser | Phe | Ser | Thr | Pro | Phe | Glu | Leu | Ser |
|     | 610 |     |     |     |     | 615 |     |     |     |     | 620 |     |     |     |     |
| Gly | Asn | Asn | Leu | Gln | Ile | Gly | Val | Thr | Gly | Leu | Ser | Ala | Gly | Asp | Lys |

|     |     |     |     |     |     |     |     |     |     |     |     |  |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|--|
| 625 |     | 630 |     | 635 | 640 |     |     |     |     |     |     |  |
| Val | Tyr | Ile | Asp | Lys | Ile | Glu | Phe | Ile | Pro | Val | Asn |  |
|     |     |     |     | 645 |     |     |     |     | 650 |     |     |  |

<210> 11  
 <211> 652  
 <212> PRT  
 <213> *Bacillus thuringiensis*

<400> 11

|     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Met | Asn | Pro | Asn | Asn | Arg | Ser | Glu | His | Asp | Thr | Ile | Lys | Val | Thr | Pro |
| 1   |     |     |     | 5   |     |     |     |     | 10  |     |     |     |     | 15  |     |
| Asn | Ser | Glu | Leu | Gln | Thr | Asn | His | Asn | Gln | Tyr | Pro | Leu | Ala | Asp | Asn |
|     |     |     | 20  |     |     |     |     | 25  |     |     |     |     | 30  |     |     |
| Pro | Asn | Ser | Thr | Leu | Glu | Glu | Leu | Asn | Tyr | Lys | Glu | Phe | Leu | Arg | Met |
|     |     | 35  |     |     |     |     | 40  |     |     |     |     | 45  |     |     |     |
| Thr | Glu | Asp | Ser | Ser | Thr | Glu | Val | Leu | Asp | Asn | Ser | Thr | Val | Lys | Asp |
|     | 50  |     |     |     |     | 55  |     |     |     |     | 60  |     |     |     |     |
| Ala | Val | Gly | Thr | Gly | Ile | Ser | Val | Val | Gly | Gln | Ile | Leu | Gly | Val | Val |
| 65  |     |     |     | 70  |     |     |     |     | 75  |     |     |     |     | 80  |     |
| Gly | Val | Pro | Phe | Ala | Gly | Ala | Leu | Thr | Ser | Phe | Tyr | Gln | Ser | Phe | Leu |
|     |     |     | 85  |     |     |     |     | 90  |     |     |     |     | 95  |     |     |
| Asn | Thr | Ile | Trp | Pro | Ser | Asp | Ala | Asp | Pro | Trp | Lys | Ala | Phe | Met | Ala |
|     |     |     | 100 |     |     |     |     | 105 |     |     |     |     | 110 |     |     |
| Gln | Val | Glu | Val | Leu | Ile | Asp | Lys | Lys | Ile | Glu | Glu | Tyr | Ala | Lys | Ser |
|     | 115 |     |     |     |     | 120 |     |     |     |     |     | 125 |     |     |     |
| Lys | Ala | Leu | Ala | Glu | Leu | Gln | Gly | Leu | Gln | Asn | Asn | Phe | Glu | Asp | Tyr |
|     | 130 |     |     |     |     | 135 |     |     |     |     | 140 |     |     |     |     |
| Val | Asn | Ala | Leu | Asn | Ser | Trp | Lys | Lys | Thr | Pro | Leu | Ser | Leu | Arg | Ser |
| 145 |     |     |     | 150 |     |     |     |     |     | 155 |     |     |     | 160 |     |
| Lys | Arg | Ser | Gln | Asp | Arg | Ile | Arg | Glu | Leu | Phe | Ser | Gln | Ala | Glu | Ser |
|     |     |     | 165 |     |     |     |     | 170 |     |     |     |     | 175 |     |     |
| His | Phe | Arg | Asn | Ser | Met | Pro | Ser | Phe | Ala | Val | Ser | Lys | Phe | Glu | Val |
|     |     |     | 180 |     |     |     |     | 185 |     |     |     |     | 190 |     |     |
| Leu | Phe | Leu | Pro | Thr | Tyr | Ala | Gln | Ala | Ala | Asn | Thr | His | Leu | Leu | Leu |
|     | 195 |     |     |     |     |     | 200 |     |     |     |     | 205 |     |     |     |
| Leu | Lys | Asp | Ala | Gln | Val | Phe | Gly | Glu | Glu | Trp | Gly | Tyr | Ser | Ser | Glu |
|     | 210 |     |     |     |     | 215 |     |     |     |     | 220 |     |     |     |     |
| Asp | Val | Ala | Glu | Phe | Tyr | His | Arg | Gln | Leu | Lys | Leu | Thr | Gln | Gln | Tyr |
| 225 |     |     |     | 230 |     |     |     |     |     | 235 |     |     |     | 240 |     |
| Thr | Asp | His | Cys | Val | Asn | Trp | Tyr | Asn | Val | Gly | Leu | Asn | Gly | Leu | Arg |
|     |     |     | 245 |     |     |     |     | 250 |     |     |     |     | 255 |     |     |
| Gly | Ser | Thr | Tyr | Asp | Ala | Trp | Val | Lys | Phe | Asn | Arg | Phe | Arg | Arg | Glu |
|     |     | 260 |     |     |     |     |     | 265 |     |     |     |     | 270 |     |     |
| Met | Thr | Leu | Thr | Val | Leu | Asp | Leu | Ile | Val | Leu | Phe | Pro | Phe | Tyr | Asp |
|     | 275 |     |     |     |     | 280 |     |     |     |     |     | 285 |     |     |     |
| Ile | Arg | Leu | Tyr | Ser | Lys | Gly | Val | Lys | Thr | Glu | Leu | Thr | Arg | Asp | Ile |
|     | 290 |     |     |     |     | 295 |     |     |     |     | 300 |     |     |     |     |
| Phe | Thr | Asp | Pro | Ile | Phe | Ser | Leu | Asn | Thr | Leu | Gln | Glu | Tyr | Gly | Pro |
| 305 |     |     |     | 310 |     |     |     |     |     | 315 |     |     |     | 320 |     |
| Thr | Phe | Leu | Ser | Ile | Glu | Asn | Ser | Ile | Arg | Lys | Pro | His | Leu | Phe | Asp |
|     |     |     | 325 |     |     |     |     |     | 330 |     |     |     | 335 |     |     |
| Tyr | Leu | Gln | Gly | Ile | Glu | Phe | His | Thr | Arg | Leu | Gln | Pro | Gly | Tyr | Phe |
|     |     | 340 |     |     |     |     |     | 345 |     |     |     |     | 350 |     |     |
| Gly | Lys | Asp | Ser | Phe | Asn | Tyr | Trp | Ser | Gly | Asn | Tyr | Val | Glu | Thr | Arg |
|     | 355 |     |     |     |     |     | 360 |     |     |     |     | 365 |     |     |     |

|     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Pro | Ser | Ile | Gly | Ser | Ser | Lys | Thr | Ile | Thr | Ser | Pro | Phe | Tyr | Gly | Asp |
|     | 370 |     |     |     |     | 375 |     |     |     |     | 380 |     |     |     |     |
| Lys | Ser | Thr | Glu | Pro | Val | Gln | Lys | Leu | Ser | Phe | Asp | Gly | Gln | Lys | Val |
| 385 |     |     |     |     | 390 |     |     |     |     | 395 |     |     |     |     | 400 |
| Tyr | Arg | Thr | Ile | Ala | Asn | Thr | Asp | Val | Ala | Ala | Trp | Pro | Asn | Gly | Lys |
|     |     |     |     | 405 |     |     |     |     | 410 |     |     |     |     | 415 |     |
| Val | Tyr | Leu | Gly | Val | Thr | Lys | Val | Asp | Phe | Ser | Gln | Tyr | Asp | Asp | Gln |
|     |     |     | 420 |     |     |     |     | 425 |     |     |     |     | 430 |     |     |
| Lys | Asn | Glu | Thr | Ser | Thr | Gln | Thr | Tyr | Asp | Ser | Lys | Arg | Asn | Asn | Gly |
|     |     | 435 |     |     |     |     | 440 |     |     |     |     | 445 |     |     |     |
| His | Val | Ser | Ala | Gln | Asp | Ser | Ile | Asp | Gln | Leu | Pro | Pro | Glu | Thr | Thr |
|     | 450 |     |     |     |     | 455 |     |     |     |     | 460 |     |     |     |     |
| Asp | Glu | Pro | Leu | Glu | Lys | Ala | Tyr | Ser | His | Gln | Leu | Asn | Tyr | Ala | Glu |
| 465 |     |     |     |     | 470 |     |     |     |     | 475 |     |     |     |     | 480 |
| Cys | Phe | Leu | Met | Gln | Asp | Arg | Arg | Gly | Thr | Ile | Pro | Phe | Phe | Thr | Trp |
|     |     |     |     | 485 |     |     |     |     | 490 |     |     |     |     | 495 |     |
| Thr | His | Arg | Ser | Val | Asp | Phe | Phe | Asn | Thr | Ile | Asp | Ala | Glu | Lys | Ile |
|     |     |     | 500 |     |     |     |     | 505 |     |     |     |     | 510 |     |     |
| Thr | Gln | Leu | Pro | Val | Val | Lys | Ala | Tyr | Ala | Leu | Ser | Ser | Gly | Ala | Ser |
|     |     | 515 |     |     |     |     | 520 |     |     |     |     | 525 |     |     |     |
| Ile | Ile | Glu | Gly | Pro | Gly | Phe | Thr | Gly | Gly | Asn | Leu | Leu | Phe | Leu | Lys |
|     | 530 |     |     |     |     | 535 |     |     |     |     | 540 |     |     |     |     |
| Glu | Ser | Ser | Asn | Ser | Ile | Ala | Lys | Phe | Lys | Val | Thr | Leu | Asn | Ser | Ala |
| 545 |     |     |     |     | 550 |     |     |     |     | 555 |     |     |     |     | 560 |
| Ala | Leu | Leu | Gln | Arg | Tyr | Arg | Val | Arg | Ile | Arg | Tyr | Ala | Ser | Thr | Thr |
|     |     |     |     | 565 |     |     |     |     | 570 |     |     |     |     | 575 |     |
| Asn | Leu | Arg | Leu | Phe | Val | Gln | Asn | Ser | Asn | Asn | Asp | Phe | Leu | Val | Ile |
|     |     |     | 580 |     |     |     |     | 585 |     |     |     |     | 590 |     |     |
| Tyr | Ile | Asn | Lys | Thr | Met | Asn | Lys | Asp | Asp | Asp | Leu | Thr | Tyr | Gln | Thr |
|     |     | 595 |     |     |     |     | 600 |     |     |     |     | 605 |     |     |     |
| Phe | Asp | Leu | Ala | Thr | Thr | Asn | Ser | Asn | Met | Gly | Phe | Ser | Gly | Asp | Lys |
|     | 610 |     |     |     |     | 615 |     |     |     |     | 620 |     |     |     |     |
| Asn | Glu | Leu | Ile | Ile | Gly | Ala | Glu | Ser | Phe | Val | Ser | Asn | Glu | Lys | Ile |
| 625 |     |     |     |     | 630 |     |     |     |     | 635 |     |     |     |     | 640 |
| Tyr | Ile | Asp | Lys | Ile | Glu | Phe | Ile | Pro | Val | Gln | Leu |     |     |     |     |
|     |     |     |     | 645 |     |     |     |     | 650 |     |     |     |     |     |     |

<210> 12

<211> 1180

<212> PRT

<213> *Bacillus thuringiensis*

<400> 12

|     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Met | Asn | Pro | Tyr | Gln | Asn | Lys | Asn | Glu | Tyr | Glu | Thr | Leu | Asn | Ala | Ser |
| 1   |     |     |     | 5   |     |     |     |     | 10  |     |     |     |     | 15  |     |
| Gln | Lys | Lys | Leu | Asn | Ile | Ser | Asn | Asn | Tyr | Thr | Arg | Tyr | Pro | Ile | Glu |
|     |     |     | 20  |     |     |     |     | 25  |     |     |     |     | 30  |     |     |
| Asn | Ser | Pro | Lys | Gln | Leu | Leu | Gln | Ser | Thr | Asn | Tyr | Lys | Asp | Trp | Leu |
|     |     | 35  |     |     |     |     | 40  |     |     |     |     | 45  |     |     |     |
| Asn | Met | Cys | Gln | Gln | Asn | Gln | Gln | Tyr | Gly | Gly | Asp | Phe | Glu | Thr | Phe |
|     | 50  |     |     |     |     | 55  |     |     |     |     | 60  |     |     |     |     |
| Ile | Asp | Ser | Gly | Glu | Leu | Ser | Ala | Tyr | Thr | Ile | Val | Val | Gly | Thr | Val |
| 65  |     |     |     |     | 70  |     |     |     |     | 75  |     |     |     | 80  |     |
| Leu | Thr | Gly | Phe | Gly | Phe | Thr | Thr | Pro | Leu | Gly | Leu | Ala | Leu | Ile | Gly |
|     |     |     |     | 85  |     |     |     |     | 90  |     |     |     |     | 95  |     |
| Phe | Gly | Thr | Leu | Ile | Pro | Val | Leu | Phe | Pro | Ala | Gln | Asp | Gln | Ser | Asn |





|     |     |     |     |     |     |     |      |     |     |     |     |      |     |     |     |
|-----|-----|-----|-----|-----|-----|-----|------|-----|-----|-----|-----|------|-----|-----|-----|
| His | Thr | Gly | Gly | Asp | Leu | Ile | Asp  | Phe | Lys | Asp | His | Phe  | Lys | Ile | Thr |
|     |     |     |     | 565 |     |     |      |     | 570 |     |     |      |     | 575 |     |
| Cys | Gln | His | Ser | Asn | Phe | Gln | Gln  | Ser | Tyr | Phe | Ile | Arg  | Ile | Arg | Tyr |
|     |     |     | 580 |     |     |     |      | 585 |     |     |     |      | 590 |     |     |
| Ala | Ser | Asn | Gly | Ser | Ala | Asn | Thr  | Arg | Ala | Val | Ile | Asn  | Leu | Ser | Ile |
|     |     | 595 |     |     |     |     | 600  |     |     |     |     | 605  |     |     |     |
| Pro | Gly | Val | Ala | Glu | Leu | Gly | Met  | Ala | Leu | Asn | Pro | Thr  | Phe | Ser | Gly |
|     | 610 |     |     |     |     | 615 |      |     |     |     | 620 |      |     |     |     |
| Thr | Asp | Tyr | Thr | Asn | Leu | Lys | Tyr  | Lys | Asp | Phe | Gln | Tyr  | Leu | Glu | Phe |
| 625 |     |     |     |     | 630 |     |      |     |     | 635 |     |      |     |     | 640 |
| Ser | Asn | Glu | Val | Lys | Phe | Ala | Pro  | Asn | Gln | Asn | Ile | Ser  | Leu | Val | Phe |
|     |     |     |     | 645 |     |     |      |     | 650 |     |     |      |     | 655 |     |
| Asn | Arg | Ser | Asp | Val | Tyr | Thr | Asn  | Thr | Thr | Val | Leu | Ile  | Asp | Lys | Ile |
|     |     |     | 660 |     |     |     |      | 665 |     |     |     |      | 670 |     |     |
| Glu | Phe | Leu | Pro | Ile | Thr | Arg | Ser  | Ile | Arg | Glu | Asp | Arg  | Glu | Lys | Gln |
|     |     | 675 |     |     |     |     | 680  |     |     |     |     | 685  |     |     |     |
| Lys | Leu | Glu | Thr | Val | Gln | Gln | Ile  | Ile | Asn | Thr | Phe | Tyr  | Ala | Asn | Pro |
|     | 690 |     |     |     |     | 695 |      |     |     |     | 700 |      |     |     |     |
| Ile | Lys | Asn | Thr | Leu | Gln | Ser | Glu  | Leu | Thr | Asp | Tyr | Asp  | Ile | Asp | Gln |
| 705 |     |     |     |     | 710 |     |      |     |     | 715 |     |      |     |     | 720 |
| Ala | Ala | Asn | Leu | Val | Glu | Cys | Ile  | Ser | Glu | Glu | Leu | Tyr  | Pro | Lys | Glu |
|     |     |     |     | 725 |     |     |      |     | 730 |     |     |      |     | 735 |     |
| Lys | Met | Leu | Leu | Leu | Asp | Glu | Val  | Lys | Asn | Ala | Lys | Gln  | Leu | Ser | Gln |
|     |     | 740 |     |     |     |     |      | 745 |     |     |     |      | 750 |     |     |
| Ser | Arg | Asn | Val | Leu | Gln | Asn | Gly  | Asp | Phe | Glu | Ser | Ala  | Thr | Leu | Gly |
|     |     | 755 |     |     |     |     | 760  |     |     |     |     | 765  |     |     |     |
| Trp | Thr | Thr | Ser | Asp | Asn | Ile | Thr  | Ile | Gln | Glu | Asp | Asp  | Pro | Ile | Phe |
|     | 770 |     |     |     |     | 775 |      |     |     |     |     | 780  |     |     |     |
| Lys | Gly | His | Tyr | Leu | His | Met | Ser  | Gly | Ala | Arg | Asp | Ile  | Asp | Gly | Thr |
| 785 |     |     |     |     | 790 |     |      |     |     | 795 |     |      |     |     | 800 |
| Ile | Phe | Pro | Thr | Tyr | Ile | Phe | Gln  | Lys | Ile | Asp | Glu | Ser  | Lys | Leu | Lys |
|     |     |     |     | 805 |     |     |      |     | 810 |     |     |      |     | 815 |     |
| Pro | Tyr | Thr | Arg | Tyr | Leu | Val | Arg  | Gly | Phe | Val | Gly | Ser  | Ser | Lys | Asp |
|     |     |     | 820 |     |     |     |      | 825 |     |     |     |      | 830 |     |     |
| Val | Glu | Leu | Val | Val | Ser | Arg | Tyr  | Gly | Glu | Glu | Ile | Asp  | Ala | Ile | Met |
|     |     | 835 |     |     |     |     | 840  |     |     |     |     | 845  |     |     |     |
| Asn | Val | Pro | Ala | Asp | Leu | Asn | Tyr  | Leu | Tyr | Pro | Ser | Thr  | Phe | Asp | Cys |
|     | 850 |     |     |     |     | 855 |      |     |     |     | 860 |      |     |     |     |
| Glu | Gly | Ser | Asn | Arg | Cys | Glu | Thr  | Ser | Ala | Val | Pro | Ala  | Asn | Ile | Gly |
| 865 |     |     |     |     | 870 |     |      |     |     | 875 |     |      |     |     | 880 |
| Asn | Thr | Ser | Asp | Met | Leu | Tyr | Ser  | Cys | Gln | Tyr | Asp | Thr  | Gly | Lys | Lys |
|     |     |     |     | 885 |     |     |      |     | 890 |     |     |      |     | 895 |     |
| His | Val | Val | Cys | Gln | Asp | Ser | His  | Gln | Phe | Ser | Phe | Thr  | Ile | Asp | Thr |
|     |     |     | 900 |     |     |     |      | 905 |     |     |     |      | 910 |     |     |
| Gly | Ala | Leu | Asp | Thr | Asn | Glu | Asn  | Ile | Gly | Val | Trp | Val  | Met | Phe | Lys |
|     |     | 915 |     |     |     |     | 920  |     |     |     |     | 925  |     |     |     |
| Ile | Ser | Ser | Pro | Asp | Gly | Tyr | Ala  | Ser | Leu | Asp | Asn | Leu  | Glu | Val | Ile |
|     | 930 |     |     |     |     | 935 |      |     |     |     | 940 |      |     |     |     |
| Glu | Glu | Gly | Pro | Ile | Asp | Gly | Glu  | Ala | Leu | Ser | Arg | Val  | Lys | His | Met |
| 945 |     |     |     |     | 950 |     |      |     |     | 955 |     |      |     |     | 960 |
| Glu | Lys | Lys | Trp | Asn | Asp | Gln | Met  | Glu | Ala | Lys | Arg | Ser  | Glu | Thr | Gln |
|     |     |     |     | 965 |     |     |      |     | 970 |     |     |      |     | 975 |     |
| Gln | Ala | Tyr | Asp | Val | Ala | Lys | Gln  | Ala | Ile | Asp | Ala | Leu  | Phe | Thr | Asn |
|     |     |     | 980 |     |     |     |      | 985 |     |     |     |      | 990 |     |     |
| Val | Gln | Asp | Glu | Ala | Leu | Gln | Phe  | Asp | Thr | Thr | Leu | Ala  | Gln | Ile | Gln |
|     |     | 995 |     |     |     |     | 1000 |     |     |     |     | 1005 |     |     |     |
| Tyr | Ala | Glu | Tyr | Leu | Val | Gln | Ser  | Ile | Pro | Tyr | Val | Tyr  | Asn | Asp | Trp |

|   |                         |      |      |      |
|---|-------------------------|------|------|------|
| 1010  |                         | 1015 |      | 1020 |
| Leu Ser Asp Val Pro Gly Met Asn Tyr Asp                         | Ile Tyr Val Glu Leu Asp |      |      |      |
| 1025  | 1030                    | 1035 | 1040 |      |
| Ala Arg Val Ala Gln Ala Arg Tyr Leu Tyr Asp Thr Arg Asn Ile Ile |                         |      |      |      |
|   | 1045                    | 1050 | 1055 |      |
| Lys Asn Gly Asp Phe Thr Gln Gly Val Met Gly Trp His Val Thr Gly |                         |      |      |      |
|   | 1060                    | 1065 | 1070 |      |
| Asn Ala Asp Val Gln Gln Ile Asp Gly Val Ser Val Leu Val Leu Ser |                         |      |      |      |
|   | 1075                    | 1080 | 1085 |      |
| Asn Trp Ser Ala Gly Val Ser Gln Asn Val His Leu Gln His Asn His |                         |      |      |      |
|   | 1090                    | 1095 | 1100 |      |
| Gly Tyr Val Leu Arg Val Ile Ala Lys Lys Glu Gly Pro Gly Asn Gly |                         |      |      |      |
| 1105  | 1110                    | 1115 | 1120 |      |
| Tyr Val Thr Leu Met Asp Cys Glu Glu Asn Gln Glu Lys Leu Thr Phe |                         |      |      |      |
|   | 1125                    | 1130 | 1135 |      |
| Thr Ser Cys Glu Glu Gly Tyr Ile Thr Lys Thr Val Asp Val Phe Pro |                         |      |      |      |
|   | 1140                    | 1145 | 1150 |      |
| Asp Thr Asp Arg Val Arg Ile Glu Ile Gly Glu Thr Glu Gly Ser Phe |                         |      |      |      |
|   | 1155                    | 1160 | 1165 |      |
| Tyr Ile Glu Ser Ile Glu Leu Ile Cys Met Asn Glu                 |                         |      |      |      |
| 1170  | 1175                    | 1180 |      |      |

<210> 13

<211> 1136

<212> PRT

<213> *Bacillus thuringiensis*

<400> 13

|   |     |     |     |  |
|---|-----|-----|-----|--|
| Met Asn Ser Gly Tyr Pro Leu Ala Asn Asp Leu Gln Gly Ser Met Lys |     |     |     |  |
| 1   | 5   | 10  | 15  |  |
| Asn Thr Asn Tyr Lys Asp Trp Leu Ala Met Cys Glu Asn Asn Gln Gln |     |     |     |  |
|   | 20  | 25  | 30  |  |
| Tyr Gly Val Asn Pro Ala Ala Ile Asn Ser Ser Ser Val Ser Thr Ala |     |     |     |  |
|   | 35  | 40  | 45  |  |
| Leu Lys Val Ala Gly Ala Ile Leu Lys Phe Val Asn Pro Pro Ala Gly |     |     |     |  |
|   | 50  | 55  | 60  |  |
| Thr Val Leu Thr Val Leu Ser Ala Val Leu Pro Ile Leu Trp Pro Thr |     |     |     |  |
| 65  | 70  | 75  | 80  |  |
| Asn Thr Pro Thr Pro Glu Arg Val Trp Asn Asp Phe Met Thr Asn Thr |     |     |     |  |
|   | 85  | 90  | 95  |  |
| Gly Asn Leu Ile Asp Gln Thr Val Thr Ala Tyr Val Arg Thr Asp Ala |     |     |     |  |
|   | 100 | 105 | 110 |  |
| Asn Ala Lys Met Thr Val Val Lys Asp Tyr Leu Asp Gln Tyr Thr Thr |     |     |     |  |
|   | 115 | 120 | 125 |  |
| Lys Phe Asn Thr Trp Lys Arg Glu Pro Asn Asn Gln Ser Tyr Arg Thr |     |     |     |  |
|   | 130 | 135 | 140 |  |
| Ala Val Ile Thr Gln Phe Asn Leu Thr Ser Ala Lys Leu Arg Glu Thr |     |     |     |  |
| 145   | 150 | 155 | 160 |  |
| Ala Val Tyr Phe Ser Asn Leu Val Gly Tyr Glu Leu Leu Leu Leu Pro |     |     |     |  |
|   | 165 | 170 | 175 |  |
| Ile Tyr Ala Gln Val Ala Asn Phe Asn Leu Leu Leu Ile Arg Asp Gly |     |     |     |  |
|   | 180 | 185 | 190 |  |
| Leu Ile Asn Ala Gln Glu Trp Ser Leu Ala Arg Ser Ala Gly Asp Gln |     |     |     |  |
|   | 195 | 200 | 205 |  |
| Leu Tyr Asn Thr Met Val Gln Tyr Thr Lys Glu Tyr Ile Ala His Ser |     |     |     |  |
| 210   | 215 | 220 |     |  |

|     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |  |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|--|
| Ile | Thr | Trp | Tyr | Asn | Lys | Gly | Leu | Asp | Val | Leu | Arg | Asn | Lys | Ser | Asn |  |
| 225 |     |     |     |     | 230 |     |     |     |     | 235 |     |     |     |     | 240 |  |
| Gly | Gln | Trp | Ile | Thr | Phe | Asn | Asp | Tyr | Lys | Arg | Glu | Met | Thr | Ile | Gln |  |
|     |     |     |     | 245 |     |     |     |     | 250 |     |     |     |     | 255 |     |  |
| Val | Leu | Asp | Ile | Leu | Ala | Leu | Phe | Ala | Ser | Tyr | Asp | Pro | Arg | Arg | Tyr |  |
|     |     |     | 260 |     |     |     |     | 265 |     |     |     |     | 270 |     |     |  |
| Pro | Ala | Asp | Lys | Ile | Asp | Asn | Thr | Lys | Leu | Ser | Lys | Thr | Glu | Phe | Thr |  |
|     |     | 275 |     |     |     |     | 280 |     |     |     |     | 285 |     |     |     |  |
| Arg | Glu | Ile | Tyr | Thr | Ala | Leu | Val | Glu | Ser | Pro | Ser | Ser | Lys | Ser | Ile |  |
|     | 290 |     |     |     |     | 295 |     |     |     |     | 300 |     |     |     |     |  |
| Ala | Ala | Leu | Glu | Ala | Ala | Leu | Thr | Arg | Asp | Val | His | Leu | Phe | Thr | Trp |  |
| 305 |     |     |     |     | 310 |     |     |     |     | 315 |     |     |     |     | 320 |  |
| Leu | Lys | Arg | Val | Asp | Phe | Trp | Thr | Asn | Thr | Ile | Tyr | Gln | Asp | Leu | Arg |  |
|     |     |     |     | 325 |     |     |     |     | 330 |     |     |     |     | 335 |     |  |
| Phe | Leu | Ser | Ala | Asn | Lys | Ile | Gly | Phe | Ser | Tyr | Thr | Asn | Ser | Ser | Ala |  |
|     |     |     | 340 |     |     |     |     | 345 |     |     |     |     | 350 |     |     |  |
| Met | Gln | Glu | Ser | Gly | Ile | Tyr | Gly | Ser | Ser | Gly | Phe | Gly | Ser | Asn | Leu |  |
|     |     | 355 |     |     |     |     | 360 |     |     |     |     | 365 |     |     |     |  |
| Thr | His | Gln | Ile | Gln | Leu | Asn | Ser | Asn | Val | Tyr | Lys | Thr | Ser | Ile | Thr |  |
|     | 370 |     |     |     |     | 375 |     |     |     |     | 380 |     |     |     |     |  |
| Asp | Thr | Ser | Ser | Pro | Ser | Asn | Arg | Val | Thr | Lys | Met | Asp | Phe | Tyr | Lys |  |
| 385 |     |     |     |     | 390 |     |     |     |     | 395 |     |     |     |     | 400 |  |
| Ile | Asp | Gly | Thr | Leu | Ala | Ser | Tyr | Asn | Ser | Asn | Ile | Thr | Pro | Thr | Pro |  |
|     |     |     |     | 405 |     |     |     |     | 410 |     |     |     |     | 415 |     |  |
| Glu | Gly | Leu | Arg | Thr | Thr | Phe | Phe | Gly | Phe | Ser | Thr | Asn | Glu | Asn | Thr |  |
|     |     |     | 420 |     |     |     |     | 425 |     |     |     |     | 430 |     |     |  |
| Pro | Asn | Gln | Pro | Thr | Val | Asn | Asp | Tyr | Thr | His | Ile | Leu | Ser | Tyr | Ile |  |
|     |     | 435 |     |     |     |     | 440 |     |     |     |     | 445 |     |     |     |  |
| Lys | Thr | Asp | Val | Ile | Asp | Tyr | Asn | Ser | Asn | Arg | Val | Ser | Phe | Ala | Trp |  |
|     | 450 |     |     |     |     | 455 |     |     |     |     | 460 |     |     |     |     |  |
| Thr | His | Lys | Ile | Val | Asp | Pro | Asn | Asn | Gln | Ile | Tyr | Thr | Asp | Ala | Ile |  |
| 465 |     |     |     |     | 470 |     |     |     |     | 475 |     |     |     |     | 480 |  |
| Thr | Gln | Val | Pro | Ala | Val | Lys | Ser | Asn | Phe | Leu | Asn | Ala | Thr | Ala | Lys |  |
|     |     |     |     | 485 |     |     |     |     | 490 |     |     |     |     | 495 |     |  |
| Val | Ile | Lys | Gly | Pro | Gly | His | Thr | Gly | Gly | Asp | Leu | Val | Ala | Leu | Thr |  |
|     |     |     | 500 |     |     |     |     | 505 |     |     |     |     | 510 |     |     |  |
| Ser | Asn | Gly | Thr | Leu | Ser | Gly | Arg | Met | Glu | Ile | Gln | Cys | Lys | Thr | Ser |  |
|     |     | 515 |     |     |     |     | 520 |     |     |     |     | 525 |     |     |     |  |
| Ile | Phe | Asn | Asp | Pro | Thr | Arg | Ser | Tyr | Gly | Leu | Arg | Ile | Arg | Tyr | Ala |  |
|     | 530 |     |     |     |     | 535 |     |     |     |     | 540 |     |     |     |     |  |
| Ala | Asn | Ser | Pro | Ile | Val | Leu | Asn | Val | Ser | Tyr | Val | Leu | Gln | Gly | Val |  |
| 545 |     |     |     |     | 550 |     |     |     |     | 555 |     |     |     |     | 560 |  |
| Ser | Arg | Gly | Thr | Thr | Ile | Ser | Thr | Glu | Ser | Thr | Phe | Ser | Arg | Pro | Asn |  |
|     |     |     |     | 565 |     |     |     |     | 570 |     |     |     |     | 575 |     |  |
| Asn | Ile | Ile | Pro | Thr | Asp | Leu | Lys | Tyr | Glu | Glu | Phe | Arg | Tyr | Lys | Asp |  |
|     |     |     | 580 |     |     |     |     | 585 |     |     |     |     | 590 |     |     |  |
| Pro | Phe | Asp | Ala | Ile | Val | Pro | Met | Arg | Leu | Ser | Ser | Asn | Gln | Leu | Ile |  |
|     |     | 595 |     |     |     |     | 600 |     |     |     |     | 605 |     |     |     |  |
| Thr | Ile | Ala | Ile | Gln | Pro | Leu | Asn | Met | Thr | Ser | Asn | Asn | Gln | Val | Ile |  |
|     | 610 |     |     |     |     | 615 |     |     |     |     |     | 620 |     |     |     |  |
| Ile | Asp | Arg | Ile | Glu | Ile | Pro | Ile | Thr | Gln | Ser | Val | Leu | Asp | Glu |     |  |
| 625 |     |     |     |     | 630 |     |     |     | 635 |     |     |     |     | 640 |     |  |
| Thr | Glu | Asn | Gln | Asn | Leu | Glu | Ser | Glu | Arg | Glu | Val | Val | Asn | Ala | Leu |  |
|     |     |     |     | 645 |     |     |     |     | 650 |     |     |     |     | 655 |     |  |
| Phe | Thr | Asn | Asp | Ala | Lys | Asp | Ala | Leu | Asn | Ile | Gly | Thr | Thr | Asp | Tyr |  |
|     |     |     | 660 |     |     |     |     | 665 |     |     |     |     | 670 |     |     |  |
| Asp | Ile | Asp | Gln | Ala | Ala | Asn | Leu | Val | Glu | Cys | Ile | Ser | Glu | Glu | Leu |  |

|      |      |     |     |     |      |      |      |     |     |     |      |      |     |     |     |  |
|------|------|-----|-----|-----|------|------|------|-----|-----|-----|------|------|-----|-----|-----|--|
|      |      | 675 |     |     |      |      | 680  |     |     |     |      | 685  |     |     |     |  |
| Tyr  | Pro  | Lys | Glu | Lys | Met  | Leu  | Leu  | Leu | Asp | Glu | Val  | Lys  | Asn | Ala | Lys |  |
|      | 690  |     |     |     |      | 695  |      |     |     |     | 700  |      |     |     |     |  |
| Gln  | Leu  | Ser | Gln | Ser | Arg  | Asn  | Val  | Leu | Gln | Asn | Gly  | Asp  | Phe | Glu | Ser |  |
| 705  |      |     |     |     | 710  |      |      |     |     | 715 |      |      |     |     | 720 |  |
| Ala  | Thr  | Leu | Gly | Trp | Thr  | Thr  | Ser  | Asp | Asn | Ile | Thr  | Ile  | Gln | Glu | Asp |  |
|      |      |     |     | 725 |      |      |      |     | 730 |     |      |      |     | 735 |     |  |
| Asp  | Pro  | Ile | Phe | Lys | Gly  | His  | Tyr  | Leu | His | Met | Ser  | Gly  | Ala | Arg | Asp |  |
|      |      |     | 740 |     |      |      |      | 745 |     |     |      |      | 750 |     |     |  |
| Ile  | Asp  | Gly | Thr | Ile | Phe  | Pro  | Thr  | Tyr | Ile | Phe | Gln  | Lys  | Ile | Asp | Glu |  |
|      |      | 755 |     |     |      |      | 760  |     |     |     |      | 765  |     |     |     |  |
| Ser  | Lys  | Leu | Lys | Pro | Tyr  | Thr  | Arg  | Tyr | Leu | Val | Arg  | Gly  | Phe | Val | Gly |  |
|      | 770  |     |     |     |      | 775  |      |     |     |     | 780  |      |     |     |     |  |
| Ser  | Ser  | Lys | Asp | Val | Glu  | Leu  | Val  | Val | Ser | Arg | Tyr  | Gly  | Glu | Glu | Ile |  |
| 785  |      |     |     |     | 790  |      |      |     |     | 795 |      |      |     |     | 800 |  |
| Asp  | Ala  | Ile | Met | Asn | Val  | Pro  | Ala  | Asp | Leu | Asn | Tyr  | Leu  | Tyr | Pro | Ser |  |
|      |      |     |     | 805 |      |      |      |     | 810 |     |      |      |     | 815 |     |  |
| Thr  | Phe  | Asp | Cys | Glu | Gly  | Ser  | Asn  | Arg | Cys | Glu | Thr  | Ser  | Ala | Val | Pro |  |
|      |      |     | 820 |     |      |      |      | 825 |     |     |      |      | 830 |     |     |  |
| Ala  | Asn  | Ile | Gly | Asn | Thr  | Ser  | Asp  | Met | Leu | Tyr | Ser  | Cys  | Gln | Tyr | Asp |  |
|      |      | 835 |     |     |      |      | 840  |     |     |     |      | 845  |     |     |     |  |
| Thr  | Gly  | Lys | Lys | His | Val  | Val  | Cys  | Gln | Asp | Ser | His  | Gln  | Phe | Ser | Phe |  |
|      | 850  |     |     |     |      | 855  |      |     |     |     | 860  |      |     |     |     |  |
| Thr  | Ile  | Asp | Thr | Gly | Ala  | Leu  | Asp  | Thr | Asn | Glu | Asn  | Ile  | Gly | Val | Trp |  |
| 865  |      |     |     |     | 870  |      |      |     |     | 875 |      |      |     |     | 880 |  |
| Val  | Met  | Phe | Lys | Ile | Ser  | Ser  | Pro  | Asp | Gly | Tyr | Ala  | Ser  | Leu | Asp | Asn |  |
|      |      |     |     | 885 |      |      |      |     | 890 |     |      |      |     | 895 |     |  |
| Leu  | Glu  | Val | Ile | Glu | Glu  | Gly  | Pro  | Ile | Asp | Gly | Glu  | Ala  | Leu | Ser | Arg |  |
|      |      |     | 900 |     |      |      |      | 905 |     |     |      |      | 910 |     |     |  |
| Val  | Lys  | His | Met | Glu | Lys  | Lys  | Trp  | Asn | Asp | Gln | Met  | Glu  | Ala | Lys | Arg |  |
|      |      | 915 |     |     |      |      | 920  |     |     |     |      | 925  |     |     |     |  |
| Ser  | Glu  | Thr | Gln | Gln | Ala  | Tyr  | Asp  | Val | Ala | Lys | Gln  | Ala  | Ile | Asp | Ala |  |
|      | 930  |     |     |     |      | 935  |      |     |     |     | 940  |      |     |     |     |  |
| Leu  | Phe  | Thr | Asn | Val | Gln  | Asp  | Glu  | Ala | Leu | Gln | Phe  | Asp  | Thr | Thr | Leu |  |
| 945  |      |     |     |     | 950  |      |      |     |     | 955 |      |      |     |     | 960 |  |
| Ala  | Gln  | Ile | Gln | Tyr | Ala  | Glu  | Tyr  | Leu | Val | Gln | Ser  | Ile  | Pro | Tyr | Val |  |
|      |      |     |     | 965 |      |      |      |     | 970 |     |      |      |     | 975 |     |  |
| Tyr  | Asn  | Asp | Trp | Leu | Ser  | Asp  | Val  | Pro | Gly | Met | Asn  | Tyr  | Asp | Ile | Tyr |  |
|      |      |     | 980 |     |      |      |      | 985 |     |     |      |      | 990 |     |     |  |
| Val  | Glu  | Leu | Asp | Ala | Arg  | Val  | Ala  | Gln | Ala | Arg | Tyr  | Leu  | Tyr | Asp | Thr |  |
|      |      | 995 |     |     |      |      | 1000 |     |     |     |      | 1005 |     |     |     |  |
| Arg  | Asn  | Ile | Ile | Lys | Asn  | Gly  | Asp  | Phe | Thr | Gln | Gly  | Val  | Met | Gly | Trp |  |
|      | 1010 |     |     |     |      | 1015 |      |     |     |     | 1020 |      |     |     |     |  |
| His  | Val  | Thr | Gly | Asn | Ala  | Asp  | Val  | Gln | Gln | Ile | Asp  | Gly  | Val | Ser | Val |  |
| 1025 |      |     |     |     | 1030 |      |      |     |     |     |      |      |     |     |     |  |

<210> 14  
 <211> 475  
 <212> PRT  
 <213> *Bacillus thuringiensis*

<400> 14

|     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Met | Ile | Ile | Asp | Ser | Lys | Thr | Thr | Leu | Pro | Arg | His | Ser | Leu | Ile | His |
| 1   |     |     |     | 5   |     |     |     |     | 10  |     |     |     |     | 15  |     |
| Thr | Ile | Lys | Leu | Asn | Ser | Asn | Lys | Lys | Tyr | Gly | Pro | Gly | Asp | Met | Thr |
|     |     |     | 20  |     |     |     |     | 25  |     |     |     |     | 30  |     |     |
| Asn | Gly | Asn | Gln | Phe | Ile | Ile | Ser | Lys | Gln | Glu | Trp | Ala | Thr | Ile | Gly |
|     |     | 35  |     |     |     |     | 40  |     |     |     |     | 45  |     |     |     |
| Ala | Tyr | Ile | Gln | Thr | Gly | Leu | Gly | Leu | Pro | Val | Asn | Glu | Gln | Gln | Leu |
|     | 50  |     |     |     |     | 55  |     |     |     |     | 60  |     |     |     |     |
| Arg | Thr | His | Val | Asn | Leu | Ser | Gln | Asp | Ile | Ser | Ile | Pro | Ser | Asp | Phe |
| 65  |     |     |     |     | 70  |     |     |     |     | 75  |     |     |     |     | 80  |
| Ser | Gln | Leu | Tyr | Asp | Val | Tyr | Cys | Ser | Asp | Lys | Thr | Ser | Ala | Glu | Trp |
|     |     |     |     | 85  |     |     |     |     | 90  |     |     |     |     | 95  |     |
| Trp | Asn | Lys | Asn | Leu | Tyr | Pro | Leu | Ile | Ile | Lys | Ser | Ala | Asn | Asp | Ile |
|     |     |     | 100 |     |     |     |     | 105 |     |     |     |     | 110 |     |     |
| Ala | Ser | Tyr | Gly | Phe | Lys | Val | Ala | Gly | Asp | Pro | Ser | Ile | Lys | Lys | Asp |
|     |     | 115 |     |     |     |     | 120 |     |     |     |     | 125 |     |     |     |
| Gly | Tyr | Phe | Lys | Lys | Leu | Gln | Asp | Glu | Leu | Asp | Asn | Ile | Val | Asp | Asn |
|     | 130 |     |     |     |     | 135 |     |     |     |     | 140 |     |     |     |     |
| Asn | Ser | Asp | Asp | Asp | Ala | Ile | Ala | Lys | Ala | Ile | Lys | Asp | Phe | Lys | Ala |
| 145 |     |     |     |     | 150 |     |     |     |     | 155 |     |     |     |     | 160 |
| Arg | Cys | Gly | Ile | Leu | Ile | Lys | Glu | Ala | Lys | Gln | Tyr | Glu | Glu | Ala | Ala |
|     |     |     |     | 165 |     |     |     |     | 170 |     |     |     |     | 175 |     |
| Lys | Asn | Ile | Val | Thr | Ser | Leu | Asp | Gln | Phe | Leu | His | Gly | Asp | Gln | Lys |
|     |     |     | 180 |     |     |     |     | 185 |     |     |     |     | 190 |     |     |
| Lys | Leu | Glu | Gly | Val | Ile | Asn | Ile | Gln | Lys | Arg | Leu | Lys | Glu | Val | Gln |
|     |     | 195 |     |     |     |     | 200 |     |     |     |     |     | 205 |     |     |
| Thr | Ala | Leu | Asn | Gln | Ala | His | Gly | Glu | Ser | Ser | Pro | Ala | His | Lys | Glu |
|     | 210 |     |     |     |     | 215 |     |     |     |     |     | 220 |     |     |     |
| Leu | Leu | Glu | Lys | Val | Lys | Asn | Leu | Lys | Thr | Thr | Leu | Glu | Arg | Thr | Ile |
| 225 |     |     |     |     | 230 |     |     |     |     | 235 |     |     |     |     | 240 |
| Lys | Ala | Glu | Gln | Asp | Leu | Glu | Lys | Lys | Val | Glu | Tyr | Ser | Phe | Leu | Leu |
|     |     |     |     | 245 |     |     |     |     | 250 |     |     |     |     | 255 |     |
| Gly | Pro | Leu | Leu | Gly | Phe | Val | Val | Tyr | Glu | Ile | Leu | Glu | Asn | Thr | Ala |
|     |     |     | 260 |     |     |     |     | 265 |     |     |     |     | 270 |     |     |
| Val | Gln | His | Ile | Lys | Asn | Gln | Ile | Asp | Glu | Ile | Lys | Lys | Gln | Leu | Asp |
|     |     | 275 |     |     |     |     | 280 |     |     |     |     |     | 285 |     |     |
| Ser | Ala | Gln | His | Asp | Leu | Asp | Arg | Asp | Val | Lys | Ile | Ile | Gly | Met | Leu |
|     | 290 |     |     |     |     | 295 |     |     |     |     | 300 |     |     |     |     |
| Asn | Ser | Ile | Asn | Thr | Asp | Ile | Asp | Asn | Leu | Tyr | Ser | Gln | Gly | Gln | Glu |
| 305 |     |     |     |     | 310 |     |     |     |     | 315 |     |     |     |     | 320 |
| Ala | Ile | Lys | Val | Phe | Gln | Lys | Leu | Gln | Gly | Ile | Trp | Ala | Thr | Ile | Gly |
|     |     |     |     | 325 |     |     |     |     | 330 |     |     |     |     | 335 |     |
| Ala | Gln | Ile | Glu | Asn | Leu | Arg | Thr | Thr | Ser | Leu | Gln | Glu | Val | Gln | Asp |
|     |     | 340 |     |     |     |     |     | 345 |     |     |     |     | 350 |     |     |
| Ser | Asp | Asp | Ala | Asp | Glu | Ile | Gln | Ile | Glu | Leu | Glu | Asp | Ala | Ser | Asp |
|     |     | 355 |     |     |     |     | 360 |     |     |     |     | 365 |     |     |     |
| Ala | Trp | Leu | Val | Val | Ala | Gln | Glu | Ala | Arg | Asp | Phe | Thr | Leu | Asn | Ala |
|     | 370 |     |     |     |     | 375 |     |     |     |     | 380 |     |     |     |     |
| Tyr | Ser | Thr | Asn | Ser | Arg | Gln | Asn | Leu | Pro | Ile | Asn | Val | Ile | Ser | Asp |

|     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 385 |     |     |     |     | 390 |     |     |     |     | 395 |     |     |     | 400 |     |
| Ser | Cys | Asn | Cys | Ser | Thr | Thr | Asn | Met | Thr | Ser | Asn | Gln | Tyr | Ser | Asn |
|     |     |     |     | 405 |     |     |     |     | 410 |     |     |     |     | 415 |     |
| Pro | Thr | Thr | Asn | Met | Thr | Ser | Asn | Gln | Tyr | Met | Ile | Ser | His | Glu | Tyr |
|     |     |     | 420 |     |     |     |     | 425 |     |     |     |     | 430 |     |     |
| Thr | Ser | Leu | Pro | Asn | Asn | Phe | Met | Leu | Ser | Arg | Asn | Ser | Asn | Leu | Glu |
|     |     | 435 |     |     |     |     | 440 |     |     |     |     | 445 |     |     |     |
| Tyr | Lys | Cys | Pro | Glu | Asn | Asn | Phe | Met | Ile | Tyr | Trp | Tyr | Asn | Asn | Ser |
|     | 450 |     |     |     |     | 455 |     |     |     |     | 460 |     |     |     |     |
| Asp | Trp | Tyr | Asn | Asn | Ser | Asp | Trp | Tyr | Asn | Asn |     |     |     |     |     |
| 465 |     |     |     |     | 470 |     |     |     |     | 475 |     |     |     |     |     |

<210> 15

<211> 1138

<212> PRT

<213> *Bacillus thuringiensis*

<400> 15

|     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Met | Asn | Leu | Asn | Asn | Leu | Asp | Gly | Tyr | Glu | Asp | Ser | Asn | Arg | Thr | Leu |
| 1   |     |     |     | 5   |     |     |     |     | 10  |     |     |     |     | 15  |     |
| Asn | Asn | Ser | Leu | Asn | Tyr | Pro | Thr | Gln | Lys | Ala | Leu | Ser | Pro | Ser | Leu |
|     |     |     | 20  |     |     |     |     | 25  |     |     |     |     | 30  |     |     |
| Lys | Asn | Met | Asn | Tyr | Gln | Asp | Phe | Leu | Ser | Ile | Thr | Glu | Arg | Glu | Gln |
|     |     | 35  |     |     |     |     | 40  |     |     |     |     | 45  |     |     |     |
| Pro | Glu | Ala | Leu | Ala | Ser | Gly | Asn | Thr | Ala | Ile | Asn | Thr | Val | Val | Ser |
|     | 50  |     |     |     |     | 55  |     |     |     |     | 60  |     |     |     |     |
| Val | Thr | Gly | Ala | Thr | Leu | Ser | Ala | Leu | Gly | Val | Pro | Gly | Ala | Ser | Phe |
| 65  |     |     |     |     | 70  |     |     |     |     | 75  |     |     |     |     | 80  |
| Ile | Thr | Asn | Phe | Tyr | Leu | Lys | Ile | Ala | Gly | Leu | Leu | Trp | Pro | Glu | Asn |
|     |     |     |     | 85  |     |     |     |     | 90  |     |     |     |     | 95  |     |
| Gly | Lys | Ile | Trp | Asp | Glu | Phe | Met | Thr | Glu | Val | Glu | Ala | Leu | Ile | Asp |
|     |     |     | 100 |     |     |     |     | 105 |     |     |     |     | 110 |     |     |
| Gln | Lys | Ile | Glu | Glu | Tyr | Val | Arg | Asn | Lys | Ala | Ile | Ala | Glu | Leu | Asp |
|     |     | 115 |     |     |     |     |     | 120 |     |     |     |     | 125 |     |     |
| Gly | Leu | Gly | Ser | Ala | Leu | Asp | Lys | Tyr | Gln | Lys | Ala | Leu | Ala | Asp | Trp |
|     | 130 |     |     |     |     | 135 |     |     |     |     | 140 |     |     |     |     |
| Leu | Gly | Lys | Gln | Asp | Asp | Pro | Glu | Ala | Ile | Leu | Ser | Val | Ala | Thr | Glu |
| 145 |     |     |     |     | 150 |     |     |     |     | 155 |     |     |     |     | 160 |
| Phe | Arg | Ile | Ile | Asp | Ser | Leu | Phe | Glu | Phe | Ser | Met | Pro | Ser | Phe | Lys |
|     |     |     |     | 165 |     |     |     |     | 170 |     |     |     |     | 175 |     |
| Val | Thr | Gly | Tyr | Glu | Ile | Pro | Leu | Leu | Thr | Val | Tyr | Ala | Gln | Ala | Ala |
|     |     |     | 180 |     |     |     |     |     | 185 |     |     |     | 190 |     |     |
| Asn | Leu | His | Leu | Ala | Leu | Leu | Arg | Asp | Ser | Thr | Leu | Tyr | Gly | Asp | Lys |
|     |     | 195 |     |     |     |     |     | 200 |     |     |     |     | 205 |     |     |
| Trp | Gly | Phe | Thr | Gln | Asn | Asn | Ile | Glu | Glu | Asn | Tyr | Asn | Arg | Gln | Lys |
|     | 210 |     |     |     |     | 215 |     |     |     |     | 220 |     |     |     |     |
| Lys | Arg | Ile | Ser | Glu | Tyr | Ser | Asp | His | Cys | Thr | Lys | Trp | Tyr | Asn | Ser |
| 225 |     |     |     |     | 230 |     |     |     |     | 235 |     |     |     |     | 240 |
| Gly | Leu | Ser | Arg | Leu | Asn | Gly | Ser | Thr | Tyr | Glu | Gln | Trp | Ile | Asn | Tyr |
|     |     |     |     | 245 |     |     |     |     | 250 |     |     |     |     | 255 |     |
| Asn | Arg | Phe | Arg | Arg | Glu | Met | Ile | Leu | Met | Ala | Leu | Asp | Leu | Val | Ala |
|     |     |     | 260 |     |     |     |     | 265 |     |     |     |     | 270 |     |     |
| Val | Phe | Pro | Phe | His | Asp | Pro | Arg | Arg | Tyr | Ser | Met | Glu | Thr | Ser | Thr |
|     |     | 275 |     |     |     |     | 280 |     |     |     |     | 285 |     |     |     |
| Gln | Leu | Thr | Arg | Glu | Val | Tyr | Thr | Asp | Pro | Val | Ser | Leu | Ser | Ile | Ser |
|     | 290 |     |     |     |     | 295 |     |     |     |     | 300 |     |     |     |     |

|     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Asn | Pro | Asp | Ile | Gly | Pro | Ser | Phe | Ser | Gln | Met | Glu | Asn | Thr | Ala | Ile | 305 | 310 | 315 | 320 |
| Arg | Thr | Pro | His | Leu | Val | Asp | Tyr | Leu | Asp | Glu | Leu | Tyr | Ile | Tyr | Thr | 325 | 330 | 335 |     |
| Ser | Lys | Tyr | Lys | Ala | Phe | Ser | His | Glu | Ile | Gln | Pro | Asp | Leu | Phe | Tyr | 340 | 345 | 350 |     |
| Trp | Ser | Ala | His | Lys | Val | Ser | Phe | Lys | Lys | Ser | Glu | Gln | Ser | Asn | Leu | 355 | 360 | 365 |     |
| Tyr | Thr | Thr | Gly | Ile | Tyr | Gly | Lys | Thr | Ser | Gly | Tyr | Ile | Ser | Ser | Gly | 370 | 375 | 380 |     |
| Ala | Tyr | Ser | Phe | His | Gly | Asn | Asp | Ile | Tyr | Arg | Thr | Leu | Ala | Ala | Pro | 385 | 390 | 395 | 400 |
| Ser | Val | Val | Val | Tyr | Pro | Tyr | Thr | Gln | Asn | Tyr | Gly | Val | Glu | Gln | Val | 405 | 410 | 415 |     |
| Glu | Phe | Tyr | Gly | Val | Lys | Gly | His | Val | His | Tyr | Arg | Gly | Asp | Asn | Lys | 420 | 425 | 430 |     |
| Tyr | Asp | Leu | Thr | Tyr | Asp | Ser | Ile | Asp | Gln | Leu | Pro | Pro | Asp | Gly | Glu | 435 | 440 | 445 |     |
| Pro | Ile | His | Glu | Lys | Tyr | Thr | His | Arg | Leu | Cys | His | Ala | Thr | Ala | Ile | 450 | 455 | 460 |     |
| Phe | Lys | Ser | Thr | Pro | Asp | Tyr | Asp | Asn | Ala | Thr | Ile | Pro | Ile | Phe | Ser | 465 | 470 | 475 | 480 |
| Trp | Thr | His | Arg | Ser | Ala | Glu | Tyr | Tyr | Asn | Arg | Ile | Tyr | Pro | Asn | Lys | 485 | 490 | 495 |     |
| Ile | Thr | Lys | Ile | Pro | Ala | Val | Lys | Met | Tyr | Lys | Leu | Asp | Asp | Pro | Ser | 500 | 505 | 510 |     |
| Thr | Val | Val | Lys | Gly | Pro | Gly | Phe | Thr | Gly | Gly | Asp | Leu | Val | Lys | Arg | 515 | 520 | 525 |     |
| Gly | Ser | Thr | Gly | Tyr | Ile | Gly | Asp | Ile | Lys | Ala | Thr | Val | Asn | Ser | Pro | 530 | 535 | 540 |     |
| Leu | Ser | Gln | Lys | Tyr | Arg | Val | Arg | Val | Arg | Tyr | Ala | Thr | Asn | Val | Ser | 545 | 550 | 555 | 560 |
| Gly | Gln | Phe | Asn | Val | Tyr | Ile | Asn | Asp | Lys | Ile | Thr | Leu | Gln | Thr | Lys | 565 | 570 | 575 |     |
| Phe | Gln | Asn | Thr | Val | Glu | Thr | Ile | Gly | Glu | Gly | Lys | Asp | Leu | Thr | Tyr | 580 | 585 | 590 |     |
| Gly | Ser | Phe | Gly | Tyr | Ile | Glu | Tyr | Ser | Thr | Thr | Ile | Gln | Phe | Pro | Asp | 595 | 600 | 605 |     |
| Glu | His | Pro | Lys | Ile | Thr | Leu | His | Leu | Ser | Asp | Leu | Ser | Asn | Asn | Ser | 610 | 615 | 620 |     |
| Ser | Phe | Tyr | Val | Asp | Ser | Ile | Glu | Phe | Ile | Pro | Val | Asp | Val | Asn | Tyr | 625 | 630 | 635 | 640 |
| Ala | Glu | Lys | Glu | Lys | Leu | Glu | Lys | Ala | Gln | Lys | Ala | Val | Asn | Thr | Leu | 645 | 650 | 655 |     |
| Phe | Thr | Glu | Gly | Arg | Asn | Ala | Leu | Gln | Lys | Asp | Val | Thr | Asp | Tyr | Lys | 660 | 665 | 670 |     |
| Val | Asp | Gln | Val | Ser | Ile | Leu | Val | Asp | Cys | Ile | Ser | Gly | Asp | Leu | Tyr | 675 | 680 | 685 |     |
| Pro | Asn | Glu | Lys | Arg | Glu | Leu | Gln | Asn | Leu | Val | Lys | Tyr | Ala | Lys | Arg | 690 | 695 | 700 |     |
| Leu | Ser | Tyr | Ser | Arg | Asn | Leu | Leu | Leu | Asp | Pro | Thr | Phe | Asp | Ser | Ile | 705 | 710 | 715 | 720 |
| Asn | Ser | Ser | Glu | Glu | Asn | Gly | Trp | Tyr | Gly | Ser | Asn | Gly | Ile | Val | Ile | 725 | 730 | 735 |     |
| Gly | Asn | Gly | Asp | Phe | Val | Phe | Lys | Gly | Asn | Tyr | Leu | Ile | Phe | Ser | Gly | 740 | 745 | 750 |     |
| Thr | Asn | Asp | Thr | Gln | Tyr | Pro | Thr | Tyr | Leu | Tyr | Gln | Lys | Ile | Asp | Glu |     |     |     |     |





|     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Met | Ser | Pro | Asn | Asn | Gln | Asn | Glu | Tyr | Glu | Ile | Ile | Asp | Ala | Thr | Pro |
| 1   |     |     |     | 5   |     |     |     |     | 10  |     |     |     |     | 15  |     |
| Ser | Thr | Ser | Val | Ser | Ser | Asp | Ser | Asn | Arg | Tyr | Pro | Phe | Ala | Asn | Glu |
|     |     |     | 20  |     |     |     |     | 25  |     |     |     |     | 30  |     |     |
| Pro | Thr | Asp | Ala | Leu | Gln | Asn | Met | Asn | Tyr | Lys | Asp | Tyr | Leu | Lys | Met |
|     |     | 35  |     |     |     |     | 40  |     |     |     |     | 45  |     |     |     |
| Ser | Gly | Gly | Glu | Asn | Pro | Glu | Leu | Phe | Gly | Asn | Pro | Glu | Thr | Phe | Ile |
|     | 50  |     |     |     |     | 55  |     |     |     |     | 60  |     |     |     |     |
| Ser | Ser | Ser | Thr | Ile | Gln | Thr | Gly | Ile | Gly | Ile | Val | Gly | Arg | Ile | Leu |
| 65  |     |     |     |     | 70  |     |     |     |     | 75  |     |     |     |     | 80  |
| Gly | Ala | Leu | Gly | Val | Pro | Phe | Ala | Ser | Gln | Ile | Ala | Ser | Phe | Tyr | Ser |
|     |     |     |     | 85  |     |     |     |     | 90  |     |     |     |     | 95  |     |
| Phe | Ile | Val | Gly | Gln | Leu | Trp | Pro | Ser | Lys | Ser | Val | Asp | Ile | Trp | Gly |
|     |     |     | 100 |     |     |     |     | 105 |     |     |     |     | 110 |     |     |
| Glu | Ile | Met | Glu | Arg | Val | Glu | Glu | Leu | Val | Asp | Gln | Lys | Ile | Glu | Lys |
|     |     | 115 |     |     |     |     | 120 |     |     |     |     | 125 |     |     |     |
| Tyr | Val | Lys | Asp | Lys | Ala | Leu | Ala | Glu | Leu | Lys | Gly | Leu | Gly | Asn | Ala |
|     | 130 |     |     |     |     |     | 135 |     |     |     |     | 140 |     |     |     |
| Leu | Asp | Val | Tyr | Gln | Gln | Ser | Leu | Glu | Asp | Trp | Leu | Glu | Asn | Arg | Asn |
| 145 |     |     |     |     | 150 |     |     |     |     | 155 |     |     |     |     | 160 |
| Asp | Ala | Arg | Thr | Arg | Ser | Val | Val | Ser | Asn | Gln | Phe | Ile | Ala | Leu | Asp |
|     |     |     |     | 165 |     |     |     |     | 170 |     |     |     |     | 175 |     |
| Leu | Asn | Phe | Val | Ser | Ser | Ile | Pro | Ser | Phe | Ala | Val | Ser | Gly | His | Glu |
|     |     |     | 180 |     |     |     |     | 185 |     |     |     |     | 190 |     |     |
| Val | Leu | Leu | Leu | Ala | Val | Tyr | Ala | Gln | Ala | Val | Asn | Leu | His | Leu | Leu |
|     | 195 |     |     |     |     |     | 200 |     |     |     |     | 205 |     |     |     |
| Leu | Leu | Arg | Asp | Ala | Ser | Ile | Phe | Gly | Glu | Glu | Trp | Gly | Phe | Thr | Pro |
|     | 210 |     |     |     |     | 215 |     |     |     |     |     | 220 |     |     |     |
| Gly | Glu | Ile | Ser | Arg | Phe | Tyr | Asn | Arg | Gln | Val | Gln | Leu | Thr | Ala | Glu |
| 225 |     |     |     |     | 230 |     |     |     |     | 235 |     |     |     |     | 240 |
| Tyr | Ser | Asp | Tyr | Cys | Val | Lys | Trp | Tyr | Lys | Ile | Gly | Leu | Asp | Lys | Leu |
|     |     |     |     | 245 |     |     |     |     | 250 |     |     |     |     | 255 |     |
| Lys | Gly | Thr | Thr | Ser | Lys | Ser | Trp | Leu | Asn | Tyr | His | Gln | Phe | Arg | Arg |
|     |     |     | 260 |     |     |     |     | 265 |     |     |     |     | 270 |     |     |
| Glu | Met | Thr | Leu | Leu | Val | Leu | Asp | Leu | Val | Ala | Leu | Phe | Pro | Asn | Tyr |
|     |     | 275 |     |     |     |     | 280 |     |     |     |     | 285 |     |     |     |
| Asp | Thr | His | Met | Tyr | Pro | Ile | Glu | Thr | Thr | Ala | Gln | Leu | Thr | Arg | Asp |
|     | 290 |     |     |     |     | 295 |     |     |     |     | 300 |     |     |     |     |
| Val | Tyr | Thr | Asp | Pro | Ile | Ala | Phe | Asn | Ile | Val | Thr | Ser | Thr | Gly | Phe |
| 305 |     |     |     |     | 310 |     |     |     |     | 315 |     |     |     |     | 320 |
| Cys | Asn | Pro | Trp | Ser | Thr | His | Ser | Gly | Ile | Leu | Phe | Tyr | Glu | Val | Glu |
|     |     |     |     | 325 |     |     |     |     | 330 |     |     |     |     | 335 |     |
| Asn | Asn | Val | Ile | Arg | Pro | Pro | His | Leu | Phe | Asp | Ile | Leu | Ser | Ser | Val |
|     |     |     | 340 |     |     |     |     | 345 |     |     |     |     | 350 |     |     |
| Glu | Ile | Asn | Thr | Ser | Arg | Gly | Gly | Ile | Thr | Leu | Asn | Asn | Asp | Ala | Tyr |
|     |     | 355 |     |     |     |     | 360 |     |     |     |     | 365 |     |     |     |
| Ile | Asn | Tyr | Trp | Ser | Gly | His | Thr | Leu | Lys | Tyr | Arg | Arg | Thr | Ala | Asp |
|     | 370 |     |     |     |     | 375 |     |     |     |     | 380 |     |     |     |     |
| Ser | Thr | Val | Thr | Tyr | Thr | Ala | Asn | Tyr | Gly | Arg | Ile | Thr | Ser | Glu | Lys |
| 385 |     |     |     |     | 390 |     |     |     |     | 395 |     |     |     |     | 400 |
| Asn | Ser | Phe | Ala | Leu | Glu | Asp | Arg | Asp | Ile | Phe | Glu | Ile | Asn | Ser | Thr |
|     |     |     |     | 405 |     |     |     |     | 410 |     |     |     |     | 415 |     |
| Val | Ala | Asn | Leu | Ala | Asn | Tyr | Tyr | Gln | Lys | Ala | Tyr | Gly | Val | Pro | Gly |
|     |     |     | 420 |     |     |     |     | 425 |     |     |     |     | 430 |     |     |
| Ser | Trp | Phe | His | Met | Val | Lys | Arg | Gly | Thr | Ser | Ser | Thr | Thr | Ala | Tyr |
|     |     | 435 |     |     |     |     | 440 |     |     |     |     | 445 |     |     |     |
| Leu | Tyr | Ser | Lys | Thr | His | Thr | Ala | Leu | Gln | Gly | Cys | Thr | Gln | Val | Tyr |

|   |     |     |     |     |
|---|-----|-----|-----|-----|
| 450   |     | 455 |     | 460 |
| Glu Ser Ser Asp Glu Ile Pro Leu Asp Arg Thr Val Pro Val Ala Glu |     |     |     |     |
| 465   |     | 470 |     | 475 |
| Ser Tyr Ser His Arg Leu Ser His Ile Thr Ser His Ser Phe Ser Lys |     |     |     |     |
|   | 485 |     | 490 | 495 |
| Asn Gly Ser Ala Tyr Tyr Gly Ser Phe Pro Val Phe Val Trp Thr His |     |     |     |     |
|   | 500 |     | 505 | 510 |
| Thr Ser Ala Asp Leu Asn Asn Thr Ile Tyr Ser Asp Lys Ile Thr Gln |     |     |     |     |
|   | 515 |     | 520 | 525 |
| Ile Pro Ala Val Lys Gly Asp Met Leu Tyr Leu Gly Gly Ser Val Val |     |     |     |     |
|   | 530 |     | 535 | 540 |
| Gln Gly Pro Gly Phe Thr Gly Gly Asp Ile Leu Lys Arg Thr Asn Pro |     |     |     |     |
| 545   |     | 550 |     | 555 |
| Ser Ile Leu Gly Thr Phe Ala Val Thr Val Asn Gly Ser Leu Ser Gln |     |     |     |     |
|   | 565 |     | 570 | 575 |
| Arg Tyr Arg Val Arg Ile Arg Tyr Ala Ser Thr Thr Asp Phe Glu Phe |     |     |     |     |
|   | 580 |     | 585 | 590 |
| Thr Leu Tyr Leu Gly Asp Thr Ile Glu Lys Asn Arg Phe Asn Lys Thr |     |     |     |     |
|   | 595 |     | 600 | 605 |
| Met Asp Asn Gly Ala Ser Leu Thr Tyr Glu Thr Phe Lys Phe Ala Ser |     |     |     |     |
|   | 610 |     | 615 | 620 |
| Phe Ile Thr Asp Phe Gln Phe Arg Glu Thr Gln Asp Lys Ile Leu Leu |     |     |     |     |
| 625   |     | 630 |     | 635 |
| Ser Met Gly Asp Phe Ser Ser Gly Gln Glu Val Tyr Ile Asp Arg Ile |     |     |     |     |
|   | 645 |     | 650 | 655 |
| Glu Phe Ile Pro Val Asp Glu Thr Tyr Glu Ala Glu Gln Asp Leu Glu |     |     |     |     |
|   | 660 |     | 665 | 670 |
| Ala Ala Lys Lys Ala Val Asn Ala Leu Phe Thr Asn Thr Lys Asp Gly |     |     |     |     |
|   | 675 |     | 680 | 685 |
| Leu Arg Pro Gly Val Thr Asp Tyr Glu Val Asn Gln Ala Ala Asn Leu |     |     |     |     |
|   | 690 |     | 695 | 700 |
| Val Glu Cys Leu Ser Asp Leu Tyr Pro Asn Glu Lys Arg Leu Leu     |     |     |     |     |
| 705   |     | 710 |     | 715 |
| Phe Asp Ala Val Arg Glu Ala Lys Arg Leu Ser Gly Ala Arg Asn Leu |     |     |     |     |
|   | 725 |     | 730 | 735 |
| Leu Gln Asp Pro Asp Phe Gln Glu Ile Asn Gly Glu Asn Gly Trp Ala |     |     |     |     |
|   | 740 |     | 745 | 750 |
| Ala Ser Thr Gly Ile Glu Ile Val Glu Gly Asp Ala Val Phe Lys Gly |     |     |     |     |
|   | 755 |     | 760 | 765 |
| Arg Tyr Leu Arg Leu Pro Gly Ala Arg Glu Ile Asp Thr Glu Thr Tyr |     |     |     |     |
|   | 770 |     | 775 | 780 |
| Pro Thr Tyr Leu Tyr Gln Lys Val Glu Glu Gly Val Leu Lys Pro Tyr |     |     |     |     |
| 785   |     | 790 |     | 795 |
| Thr Arg Tyr Arg Leu Arg Gly Phe Val Gly Ser Ser Gln Gly Leu Glu |     |     |     |     |
|   | 805 |     | 810 | 815 |
| Ile Tyr Thr Ile Arg His Gln Thr Asn Arg Ile Val Lys Asn Val Pro |     |     |     |     |
|   | 820 |     | 825 | 830 |
| Asp Asp Leu Leu Pro Asp Val Ser Pro Val Asn Ser Asp Gly Ser Ile |     |     |     |     |
|   | 835 |     | 840 | 845 |
| Asn Arg Cys Ser Glu Gln Lys Tyr Val Asn Ser Arg Leu Glu Gly Glu |     |     |     |     |
|   | 850 |     | 855 | 860 |
| Asn Arg Ser Gly Asp Ala His Glu Phe Ser Leu Pro Ile Asp Ile Gly |     |     |     |     |
| 865   |     | 870 |     | 875 |
| Glu Leu Asp Tyr Asn Glu Asn Ala Gly Ile Trp Val Gly Phe Lys Ile |     |     |     |     |
|   | 885 |     | 890 | 895 |
| Thr Asp Pro Glu Gly Tyr Ala Thr Leu Gly Asn Leu Glu Leu Val Glu |     |     |     |     |
|   | 900 |     | 905 | 910 |

Glu Gly Pro Leu Ser Gly Asp Ala Leu Glu Arg Leu Gln Arg Glu Glu  
 915 920 925  
 Gln Gln Trp Lys Ile Gln Met Thr Arg Arg Arg Glu Glu Thr Asp Arg  
 930 935 940  
 Arg Tyr Met Ala Ser Lys Gln Ala Val Asp Arg Leu Tyr Ala Asp Tyr  
 945 950 955 960  
 Gln Asp Gln Gln Leu Asn Pro Asp Val Glu Ile Thr Asp Leu Thr Ala  
 965 970 975  
 Ala Gln Asp Leu Ile Gln Ser Ile Pro Tyr Val Tyr Asn Glu Met Phe  
 980 985 990  
 Pro Glu Ile Pro Gly Met Asn Tyr Thr Lys Phe Thr Glu Leu Thr Asp  
 995 1000 1005  
 Arg Leu Gln Gln Ala Trp Asn Leu Tyr Asp Gln Arg Asn Ala Ile Pro  
 1010 1015 1020  
 Asn Gly Asp Phe Arg Asn Gly Leu Ser Asn Trp Asn Ala Thr Pro Gly  
 1025 1030 1035 1040  
 Val Glu Val Gln Gln Ile Asn His Thr Ser Val Leu Val Ile Pro Asn  
 1045 1050 1055  
 Trp Asp Glu Gln Val Ser Gln Gln Phe Thr Val Gln Pro Asn Gln Arg  
 1060 1065 1070  
 Tyr Val Leu Arg Val Thr Ala Arg Lys Glu Gly Val Gly Asn Gly Tyr  
 1075 1080 1085  
 Val Ser Ile Arg Asp Gly Gly Asn Gln Ser Glu Thr Leu Thr Phe Ser  
 1090 1095 1100  
 Ala Ser Asp Tyr Asp Thr Asn Gly Val Tyr Asn Asp Gln Thr Gly Tyr  
 1105 1110 1115 1120  
 Ile Thr Lys Thr Val Thr Phe Ile Pro Tyr Thr Asp Gln Met Trp Ile  
 1125 1130 1135  
 Glu Ile Ser Glu Thr Glu Gly Thr Phe Tyr Ile Glu Ser Val Glu Leu  
 1140 1145 1150  
 Ile Val Asp Val Glu  
 1155

<210> 17  
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 <212> PRT  
 <213> *Bacillus thuringiensis*

<400> 17  
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 1 5 10 15  
 Ser Asn Gly Phe Ser Lys Ser Asn Asn Tyr Ser Arg Tyr Pro Leu Ala  
 20 25 30  
 Asn Lys Pro Asn Gln Pro Leu Lys Asn Thr Asn Tyr Lys Asp Trp Leu  
 35 40 45  
 Asn Val Cys Gln Asp Asn Gln Gln Tyr Gly Asn Asn Ala Gly Asn Phe  
 50 55 60  
 Ala Ser Ser Glu Thr Ile Val Gly Val Ser Ala Gly Ile Ile Val Val  
 65 70 75 80  
 Gly Thr Met Leu Gly Ala Phe Ala Ala Pro Val Leu Ala Ala Gly Ile  
 85 90 95  
 Ile Ser Phe Gly Thr Leu Leu Pro Ile Phe Trp Gln Gly Ser Asp Pro  
 100 105 110  
 Ala Asn Val Trp Gln Asp Leu Leu Asn Ile Gly Gly Arg Pro Ile Gln  
 115 120 125  
 Glu Ile Asp Lys Asn Ile Ile Asn Val Leu Thr Ser Ile Val Thr Pro

|                         |                     |                     |             |     |
|-------------------------|---------------------|---------------------|-------------|-----|
| 130                     |                     | 135                 |             | 140 |
| Ile Lys Asn Gln Leu Asp | Lys Tyr Gln Glu Phe | Phe Asp Lys Trp Glu |             |     |
| 145                     | 150                 | 155                 | 160         |     |
| Pro Ala Arg Thr His     | Ala Asn Ala Lys Ala | Val His Asp Leu Phe | Thr         |     |
|                         | 165                 | 170                 | 175         |     |
| Thr Leu Glu Pro Ile     | Ile Asp Lys Asp     | Leu Asp Met Leu     | Lys Asn Asn |     |
|                         | 180                 | 185                 | 190         |     |
| Ala Ser Tyr Arg Ile     | Pro Thr Leu Pro     | Ala Tyr Ala Gln     | Ile Ala Thr |     |
|                         | 195                 | 200                 | 205         |     |
| Trp His Leu Asn Leu     | Leu Lys His Ala     | Ala Thr Tyr Tyr     | Asn Ile Trp |     |
|                         | 210                 | 215                 | 220         |     |
| Leu Gln Asn Gln Gly     | Ile Asn Pro Ser     | Thr Phe Asn Ser     | Ser Asn Tyr |     |
| 225                     | 230                 | 235                 | 240         |     |
| Tyr Gln Gly Tyr Leu     | Lys Arg Lys Ile     | Gln Glu Tyr Thr     | Asp Tyr Cys |     |
|                         | 245                 | 250                 | 255         |     |
| Ile Gln Thr Tyr Asn     | Ala Gly Leu Thr     | Met Ile Arg Thr     | Asn Thr Asn |     |
|                         | 260                 | 265                 | 270         |     |
| Ala Thr Trp Asn Met     | Tyr Asn Thr Tyr     | Arg Leu Glu Met     | Thr Leu Thr |     |
|                         | 275                 | 280                 | 285         |     |
| Val Leu Asp Leu Ile     | Ala Ile Phe Pro     | Asn Tyr Asp Pro     | Glu Lys Tyr |     |
|                         | 290                 | 295                 | 300         |     |
| Pro Ile Gly Val Lys     | Ser Glu Leu Ile     | Arg Glu Val Tyr     | Thr Asn Val |     |
| 305                     | 310                 | 315                 | 320         |     |
| Asn Ser Asp Thr Phe     | Arg Thr Ile Thr     | Glu Leu Glu Asn     | Gly Leu Thr |     |
|                         | 325                 | 330                 | 335         |     |
| Arg Asn Pro Thr Leu     | Phe Thr Trp Ile     | Asn Gln Gly Arg     | Phe Tyr Thr |     |
|                         | 340                 | 345                 | 350         |     |
| Arg Asn Ser Arg Asp     | Ile Leu Asp Pro     | Tyr Asp Ile Phe     | Ser Phe Thr |     |
|                         | 355                 | 360                 | 365         |     |
| Gly Asn Gln Met Ala     | Phe Thr His Thr     | Asn Asp Asp Arg     | Asn Ile Ile |     |
|                         | 370                 | 375                 | 380         |     |
| Trp Gly Ala Val His     | Gly Asn Ile Ile     | Ser Gln Asp Thr     | Ser Lys Val |     |
| 385                     | 390                 | 395                 | 400         |     |
| Phe Pro Phe Tyr Arg     | Asn Lys Pro Ile     | Asp Lys Val Glu     | Ile Val Arg |     |
|                         | 405                 | 410                 | 415         |     |
| His Arg Glu Tyr Ser     | Asp Ile Ile Tyr     | Glu Met Ile Phe     | Phe Ser Asn |     |
|                         | 420                 | 425                 | 430         |     |
| Ser Ser Glu Val Phe     | Arg Tyr Ser Ser     | Asn Ser Thr Ile     | Glu Asn Asn |     |
|                         | 435                 | 440                 | 445         |     |
| Tyr Lys Arg Thr Asp     | Ser Tyr Met Ile     | Pro Lys Gln Thr     | Trp Lys Asn |     |
|                         | 450                 | 455                 | 460         |     |
| Glu Glu Tyr Gly His     | Thr Leu Ser Tyr     | Ile Lys Thr Asp     | Asn Tyr Ile |     |
| 465                     | 470                 | 475                 | 480         |     |
| Phe Ser Val Val Arg     | Glu Arg Arg Arg     | Val Ala Phe Ser     | Trp Thr His |     |
|                         | 485                 | 490                 | 495         |     |
| Thr Ser Val Asp Phe     | Gln Asn Thr Ile     | Asp Leu Asp Asn     | Ile Thr Gln |     |
|                         | 500                 | 505                 | 510         |     |
| Ile His Ala Leu Lys     | Ala Leu Lys Val     | Ser Ser Asp Ser     | Lys Ile Val |     |
|                         | 515                 | 520                 | 525         |     |
| Lys Gly Pro Gly His     | Thr Gly Asp Leu     | Val Ile Leu Lys     | Asp Ser     |     |
|                         | 530                 | 535                 | 540         |     |
| Met Asp Phe Arg Val     | Arg Phe Leu Lys     | Asn Val Ser Arg     | Gln Tyr Gln |     |
| 545                     | 550                 | 555                 | 560         |     |
| Val Arg Ile Arg Tyr     | Ala Thr Asn Ala     | Pro Lys Thr Thr     | Val Phe Leu |     |
|                         | 565                 | 570                 | 575         |     |
| Thr Gly Ile Asp Thr     | Ile Ser Val Glu     | Leu Pro Ser Thr     | Thr Ser Arg |     |
|                         | 580                 | 585                 | 590         |     |

|     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Gln | Asn | Pro | Asn | Ala | Thr | Asp | Leu | Thr | Tyr | Ala | Asp | Phe | Gly | Tyr | Val |
|     |     | 595 |     |     |     |     | 600 |     |     |     |     | 605 |     |     |     |
| Thr | Phe | Pro | Arg | Thr | Val | Pro | Asn | Lys | Thr | Phe | Glu | Gly | Glu | Asp | Thr |
|     | 610 |     |     |     |     | 615 |     |     |     | 620 |     |     |     |     |     |
| Leu | Leu | Met | Thr | Leu | Tyr | Gly | Thr | Pro | Asn | His | Ser | Tyr | Asn | Ile | Tyr |
| 625 |     |     |     |     | 630 |     |     |     | 635 |     |     |     |     |     | 640 |
| Ile | Asp | Lys | Ile | Glu | Phe | Ile | Pro | Ile | Thr | Gln | Ser | Val | Leu | Asp | Tyr |
|     |     |     |     | 645 |     |     |     |     | 650 |     |     |     |     | 655 |     |
| Thr | Glu | Lys | Gln | Asn | Ile | Glu | Lys | Thr | Gln | Lys | Ile | Val | Asn | Asp | Leu |
|     |     |     | 660 |     |     |     |     | 665 |     |     |     |     | 670 |     |     |
| Phe | Val | Asn |     |     |     |     |     |     |     |     |     |     |     |     |     |
|     |     | 675 |     |     |     |     |     |     |     |     |     |     |     |     |     |

<210> 18

<211> 648

<212> PRT

<213> Bacillus thuringiensis

<400> 18

|     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Met | His | Tyr | Tyr | Gly | Asn | Arg | Asn | Glu | Tyr | Asp | Ile | Leu | Asn | Ala | Ser |
| 1   |     |     |     | 5   |     |     |     | 10  |     |     |     |     | 15  |     |     |
| Ser | Asn | Asp | Ser | Asn | Met | Ser | Asn | Thr | Tyr | Pro | Arg | Tyr | Pro | Leu | Ala |
|     |     |     | 20  |     |     |     | 25  |     |     |     |     | 30  |     |     |     |
| Asn | Pro | Gln | Gln | Asp | Leu | Met | Gln | Asn | Thr | Asn | Tyr | Lys | Asp | Trp | Leu |
|     |     | 35  |     |     |     | 40  |     |     |     |     | 45  |     |     |     |     |
| Asn | Val | Cys | Glu | Gly | Tyr | His | Ile | Glu | Asn | Pro | Arg | Glu | Ala | Ser | Val |
|     | 50  |     |     |     |     | 55  |     |     |     | 60  |     |     |     |     |     |
| Arg | Ala | Gly | Leu | Gly | Lys | Gly | Leu | Gly | Ile | Val | Ser | Thr | Ile | Val | Gly |
| 65  |     |     |     |     | 70  |     |     |     |     | 75  |     |     |     |     | 80  |
| Phe | Phe | Gly | Gly | Ser | Ile | Ile | Leu | Asp | Thr | Ile | Gly | Leu | Phe | Tyr | Gln |
|     |     |     |     | 85  |     |     |     |     | 90  |     |     |     |     | 95  |     |
| Ile | Ser | Glu | Leu | Leu | Trp | Pro | Glu | Asp | Asp | Thr | Gln | Gln | Tyr | Thr | Trp |
|     |     |     | 100 |     |     |     |     | 105 |     |     |     |     | 110 |     |     |
| Gln | Asp | Ile | Met | Asn | His | Val | Glu | Asp | Leu | Ile | Asp | Lys | Arg | Ile | Thr |
|     |     | 115 |     |     |     |     | 120 |     |     |     |     | 125 |     |     |     |
| Glu | Val | Ile | Arg | Gly | Asn | Ala | Ile | Arg | Thr | Leu | Ala | Asp | Leu | Gln | Gly |
|     | 130 |     |     |     |     | 135 |     |     |     |     | 140 |     |     |     |     |
| Lys | Val | Asp | Asp | Tyr | Asn | Asn | Trp | Leu | Lys | Lys | Trp | Lys | Asp | Asp | Pro |
| 145 |     |     |     |     | 150 |     |     |     |     | 155 |     |     |     |     | 160 |
| Lys | Ser | Thr | Gly | Asn | Leu | Ser | Thr | Leu | Val | Thr | Lys | Phe | Thr | Ala | Leu |
|     |     |     |     | 165 |     |     |     |     | 170 |     |     |     |     | 175 |     |
| Asp | Ser | Asp | Phe | Asn | Gly | Ala | Ile | Arg | Thr | Val | Asn | Asn | Gln | Gly | Ser |
|     |     |     | 180 |     |     |     |     | 185 |     |     |     |     | 190 |     |     |
| Pro | Gly | Tyr | Glu | Leu | Leu | Leu | Leu | Pro | Val | Tyr | Ala | Gln | Ile | Ala | Asn |
|     |     | 195 |     |     |     |     | 200 |     |     |     |     | 205 |     |     |     |
| Leu | His | Leu | Leu | Leu | Leu | Arg | Asp | Ala | Gln | Ile | Tyr | Gly | Asp | Lys | Trp |
|     | 210 |     |     |     |     | 215 |     |     |     |     | 220 |     |     |     |     |
| Trp | Ser | Ala | Arg | Ala | Asn | Ala | Arg | Asp | Asn | Tyr | Tyr | Gln | Ile | Gln | Leu |
| 225 |     |     |     |     | 230 |     |     |     |     | 235 |     |     |     |     | 240 |
| Glu | Lys | Thr | Lys | Glu | Tyr | Thr | Glu | Tyr | Cys | Ile | Asn | Trp | Tyr | Asn | Lys |
|     |     |     |     | 245 |     |     |     |     | 250 |     |     |     |     | 255 |     |
| Gly | Leu | Asn | Asp | Phe | Arg | Thr | Ala | Gly | Gln | Trp | Val | Asn | Phe | Asn | Arg |
|     |     |     | 260 |     |     |     |     | 265 |     |     |     |     | 270 |     |     |
| Tyr | Arg | Arg | Glu | Met | Thr | Leu | Thr | Val | Leu | Asp | Ile | Ile | Ser | Met | Phe |
|     |     | 275 |     |     |     |     | 280 |     |     |     |     | 285 |     |     |     |
| Pro | Ile | Tyr | Asp | Ala | Arg | Leu | Tyr | Pro | Thr | Glu | Val | Lys | Thr | Glu | Leu |

|   |     |     |     |     |
|---|-----|-----|-----|-----|
| 290   |     | 295 |     | 300 |
| Thr Arg Glu Ile Tyr Ser Asp Val Ile Asn Gly Glu Ile Tyr Gly Leu |     |     |     |     |
| 305   |     | 310 |     | 315 |
| Met Thr Pro Tyr Phe Ser Phe Glu Lys Ala Glu Ser Leu Tyr Thr Arg |     |     |     |     |
|   | 325 |     | 330 |     |
| Ala Pro His Leu Phe Thr Trp Leu Lys Gly Phe Arg Phe Val Thr Asn |     |     |     |     |
|   | 340 |     | 345 |     |
| Ser Ile Ser Tyr Trp Thr Phe Leu Ser Gly Gly Gln Asn Lys Tyr Ser |     |     |     |     |
|   | 355 |     | 360 |     |
| Tyr Thr Asn Asn Ser Ser Ile Asn Glu Gly Ser Phe Arg Gly Gln Asp |     |     |     |     |
|   | 370 |     | 375 |     |
| Thr Asp Tyr Gly Gly Thr Ser Ser Thr Ile Asn Ile Pro Ser Asn Ser |     |     |     |     |
| 385   |     | 390 |     | 395 |
| Tyr Val Tyr Asn Leu Trp Thr Glu Asn Tyr Glu Tyr Ile Tyr Pro Trp |     |     |     |     |
|   | 405 |     | 410 |     |
| Gly Asp Pro Val Asn Ile Thr Lys Met Asn Phe Ser Val Thr Asp Asn |     |     |     |     |
|   | 420 |     | 425 |     |
| Asn Ser Ser Lys Glu Leu Ile Tyr Gly Ala His Arg Thr Asn Lys Pro |     |     |     |     |
|   | 435 |     | 440 |     |
| Val Val Arg Thr Asp Phe Asp Phe Leu Thr Asn Lys Glu Gly Thr Glu |     |     |     |     |
|   | 450 |     | 455 |     |
| Leu Ala Lys Tyr Asn Asp Tyr Asn His Ile Leu Ser Tyr Met Leu Ile |     |     |     |     |
| 465   |     | 470 |     | 475 |
| Asn Gly Glu Thr Phe Gly Gln Lys Arg His Gly Tyr Ser Phe Ala Phe |     |     |     |     |
|   | 485 |     | 490 |     |
| Thr His Ser Ser Val Asp Pro Asn Asn Thr Ile Ala Ala Asn Lys Ile |     |     |     |     |
|   | 500 |     | 505 |     |
| Thr Gln Ile Pro Val Val Lys Ala Ser Ser Ile Asn Gly Ser Ile Ser |     |     |     |     |
|   | 515 |     | 520 |     |
| Ile Glu Lys Gly Pro Gly Phe Thr Gly Gly Asp Leu Val Lys Met Arg |     |     |     |     |
|   | 530 |     | 535 |     |
| Ala Asp Ser Gly Leu Thr Met Arg Phe Lys Ala Glu Leu Leu Asp Lys |     |     |     |     |
| 545   |     | 550 |     | 555 |
| Lys Tyr Arg Val Arg Ile Arg Tyr Lys Cys Asn Tyr Ser Ser Lys Leu |     |     |     |     |
|   | 565 |     | 570 |     |
| Ile Leu Arg Lys Trp Lys Gly Glu Gly Tyr Ile Gln Gln Gln Ile His |     |     |     |     |
|   | 580 |     | 585 |     |
| Asn Ile Ser Pro Thr Tyr Gly Ala Phe Ser Tyr Leu Glu Ser Phe Thr |     |     |     |     |
|   | 595 |     | 600 |     |
| Ile Thr Thr Thr Glu Asn Ile Phe Asp Leu Thr Met Glu Val Thr Tyr |     |     |     |     |
|   | 610 |     | 615 |     |
| Pro Tyr Gly Arg Gln Phe Val Glu Asp Ile Pro Ser Leu Ile Leu Asp |     |     |     |     |
| 625   |     | 630 |     | 635 |
| Lys Ile Glu Phe Leu Pro Thr Asn                                 |     |     |     |     |
|   | 645 |     |     |     |

<210> 19

<211> 722

<212> PRT

<213> Bacillus thuringiensis

<400> 19

|   |
|---|
| Met Lys Glu Gln Asn Leu Asn Lys Tyr Asp Glu Ile Thr Val Gln Ala |
| 1 5 10 15   |
| Ala Ser Asp Tyr Ile Asp Ile Arg Pro Ile Phe Gln Thr Asn Gly Ser |
| 20 25 30  |

|     |     |     |       |     |     |     |     |     |     |     |     |     |     |     |     |
|-----|-----|-----|-------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Ala | Thr | Phe | Asn   | Ser | Asn | Thr | Asn | Ile | Thr | Thr | Leu | Thr | Gln | Ala | Ile |
|     |     | 35  |       |     |     |     | 40  |     |     |     | 45  |     |     |     |     |
| Asn | Ser | Gln | Ala   | Gly | Ala | Ile | Ala | Gly | Lys | Thr | Ala | Leu | Asp | Met | Arg |
|     | 50  |     |       |     |     | 55  |     |     |     |     | 60  |     |     |     |     |
| His | Asp | Phe | Thr   | Phe | Arg | Ala | Asp | Ile | Phe | Leu | Gly | Thr | Lys | Ser | Asn |
| 65  |     |     |       |     | 70  |     |     |     |     | 75  |     |     |     |     | 80  |
| Gly | Ala | Asp | Gly   | Ile | Ala | Ile | Ala | Phe | His | Arg | Gly | Ser | Ile | Gly | Phe |
|     |     |     |       | 85  |     |     |     |     | 90  |     |     |     |     | 95  |     |
| Val | Gly | Thr | Lys   | Gly | Gly | Gly | Leu | Gly | Ile | Leu | Gly | Ala | Pro | Lys | Gly |
|     |     |     | 100   |     |     |     |     | 105 |     |     |     |     | 110 |     |     |
| Ile | Gly | Phe | Glu   | Leu | Asp | Thr | Tyr | Ala | Asn | Ala | Pro | Glu | Asp | Glu | Val |
|     |     | 115 |       |     |     |     | 120 |     |     |     |     | 125 |     |     |     |
| Gly | Asp | Ser | Phe   | Gly | His | Gly | Ala | Met | Lys | Gly | Ser | Phe | Pro | Ser | Phe |
|     |     | 130 |       |     |     | 135 |     |     |     |     | 140 |     |     |     |     |
| Pro | Asn | Gly | Tyr   | Pro | His | Ala | Gly | Phe | Val | Ser | Thr | Asp | Lys | Asn | Ser |
| 145 |     |     |       |     | 150 |     |     |     |     | 155 |     |     |     |     | 160 |
| Arg | Trp | Leu | Ser   | Ala | Leu | Ala | Gln | Met | Gln | Arg | Ile | Ala | Ala | Pro | Asn |
|     |     |     | 165   |     |     |     |     |     | 170 |     |     |     |     | 175 |     |
| Gly | Arg | Trp | Arg   | Arg | Leu | Glu | Ile | Arg | Trp | Asp | Ala | Arg | Asn | Lys | Glu |
|     |     |     | 180   |     |     |     |     | 185 |     |     |     |     | 190 |     |     |
| Leu | Thr | Ala | Asn   | Leu | Gln | Asp | Leu | Thr | Phe | Asn | Asp | Ile | Thr | Val | Gly |
|     |     | 195 |       |     |     |     | 200 |     |     |     |     | 205 |     |     |     |
| Glu | Lys | Pro | Arg   | Thr | Pro | Arg | Thr | Ala | Thr | Trp | Arg | Leu | Val | Asn | Pro |
|     | 210 |     |       |     |     | 215 |     |     |     |     | 220 |     |     |     |     |
| Ala | Phe | Glu | Leu   | Asp | Gln | Lys | Tyr | Thr | Phe | Val | Ile | Gly | Ser | Ala | Thr |
| 225 |     |     |       |     | 230 |     |     |     |     | 235 |     |     |     |     | 240 |
| Gly | Ala | Ser | Asn   | Asn | Leu | His | Gln | Ile | Gly | Ile | Ile | Glu | Phe | Asp | Ala |
|     |     |     |       | 245 |     |     |     |     | 250 |     |     |     |     | 255 |     |
| Tyr | Phe | Thr | Lys   | Pro | Thr | Ile | Glu | Ala | Asn | Asn | Val | Asn | Val | Pro | Val |
|     |     |     | 260   |     |     |     |     | 265 |     |     |     |     | 270 |     |     |
| Gly | Ala | Thr | Phe   | Asn | Pro | Lys | Thr | Tyr | Pro | Gly | Ile | Asn | Leu | Arg | Ala |
|     |     | 275 |       |     |     |     | 280 |     |     |     |     | 285 |     |     |     |
| Thr | Asp | Glu | Ile   | Asp | Gly | Asp | Leu | Thr | Ser | Lys | Ile | Ile | Val | Lys | Ala |
|     | 290 |     |       |     |     | 295 |     |     |     |     | 300 |     |     |     |     |
| Asn | Asn | Val | Asn   | Thr | Ser | Lys | Thr | Gly | Val | Tyr | Tyr | Val | Thr | Tyr | Tyr |
| 305 |     |     |       |     | 310 |     |     |     |     | 315 |     |     |     |     | 320 |
| Val | Glu | Asn | Ser   | Tyr | Gly | Glu | Ser | Asp | Glu | Lys | Thr | Ile | Glu | Val | Thr |
|     |     |     |       | 325 |     |     |     |     | 330 |     |     |     |     | 335 |     |
| Val | Phe | Ser | Asn   | Pro | Thr | Ile | Ile | Ala | Ser | Asp | Val | Glu | Ile | Glu | Lys |
|     |     |     | 340   |     |     |     |     | 345 |     |     |     |     | 350 |     |     |
| Gly | Glu | Ser | Phe   | Asn | Pro | Leu | Thr | Asp | Ser | Arg | Val | Gly | Leu | Ser | Ala |
|     |     | 355 |       |     |     |     | 360 |     |     |     |     | 365 |     |     |     |
| Gln | Asp | Ser | Leu   | Gly | Asn | Asp | Ile | Thr | Gln | Asn | Val | Lys | Val | Lys | Ser |
|     | 370 |     |       |     |     | 375 |     |     |     |     | 380 |     |     |     |     |
| Ser | Asn | Val | Asp</ |     |     |     |     |     |     |     |     |     |     |     |     |





|     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Ala | Trp | Asn | Asn | Asn | Lys | Ser | Asn | Ile | Asn | Tyr | Gln | Thr | Asn | Val | Ala |
| 145 |     |     |     |     | 150 |     |     |     |     | 155 |     |     |     |     | 160 |
| Glu | Ala | Phe | Lys | Thr | Val | Glu | Arg | Glu | Phe | Phe | Thr | Lys | Leu | Lys | Gly |
|     |     |     |     | 165 |     |     |     |     |     | 170 |     |     |     |     | 175 |
| Ile | Tyr | Arg | Thr | Ser | Ser | Ser | Gln | Ile | Thr | Leu | Leu | Pro | Thr | Phe | Thr |
|     |     |     | 180 |     |     |     |     |     | 185 |     |     |     |     | 190 |     |
| Gln | Ala | Ala | Asn | Leu | His | Leu | Ser | Met | Leu | Arg | Asp | Ala | Val | Met | Tyr |
|     |     |     | 195 |     |     |     |     | 200 |     |     |     | 205 |     |     |     |
| Gln | Glu | Gly | Trp | Asn | Leu | Gln | Ser | His | Ile | Asn | Tyr | Ser | Lys | Glu | Leu |
|     | 210 |     |     |     |     | 215 |     |     |     |     | 220 |     |     |     |     |
| Asp | Asp | Ala | Leu | Glu | Asp | Tyr | Thr | Asn | Tyr | Cys | Val | Glu | Val | Tyr | Thr |
| 225 |     |     |     |     | 230 |     |     |     |     | 235 |     |     |     |     | 240 |
| Lys | Gly | Leu | Asn | Ala | Leu | Arg | Gly | Ser | Thr | Ala | Ile | Asp | Trp | Leu | Glu |
|     |     |     |     | 245 |     |     |     |     | 250 |     |     |     |     | 255 |     |
| Phe | Asn | Ser | Phe | Arg | Arg | Asp | Met | Thr | Leu | Met | Val | Leu | Asp | Leu | Val |
|     |     |     | 260 |     |     |     |     | 265 |     |     |     |     |     | 270 |     |
| Ala | Ile | Phe | Pro | Asn | Tyr | Asn | Pro | Val | Arg | Tyr | Pro | Leu | Ser | Thr | Lys |
|     |     | 275 |     |     |     |     | 280 |     |     |     |     | 285 |     |     |     |
| Ile | Ser | Leu | Ser | Arg | Lys | Ile | Tyr | Thr | Asp | Pro | Val | Gly | Arg | Thr | Asp |
|     | 290 |     |     |     |     | 295 |     |     |     |     | 300 |     |     |     |     |
| Ser | Pro | Ser | Phe | Gly | Asp | Trp | Thr | Asn | Thr | Gly | Arg | Thr | Leu | Ala | Asn |
| 305 |     |     |     |     | 310 |     |     |     |     | 315 |     |     |     |     | 320 |
| Phe | Asn | Asp | Leu | Glu | Arg | Glu | Val | Thr | Asp | Ser | Pro | Ser | Leu | Val | Lys |
|     |     |     |     | 325 |     |     |     |     | 330 |     |     |     |     | 335 |     |
| Trp | Leu | Gly | Asp | Met | Thr | Ile | Tyr | Thr | Gly | Ala | Ile | Asp | Ser | Tyr | Arg |
|     |     |     | 340 |     |     |     |     | 345 |     |     |     |     | 350 |     |     |
| Pro | Thr | Ser | Pro | Gly | Asp | Arg | Ile | Gly | Val | Trp | Tyr | Gly | Asn | Ile | Asn |
|     |     | 355 |     |     |     |     | 360 |     |     |     |     | 365 |     |     |     |
| Ala | Phe | Tyr | His | Thr | Gly | Arg | Thr | Asp | Val | Val | Met | Phe | Arg | Gln | Thr |
|     | 370 |     |     |     |     | 375 |     |     |     |     | 380 |     |     |     |     |
| Gly | Asp | Thr | Ala | Tyr | Glu | Asp | Pro | Ser | Thr | Phe | Ile | Ser | Asn | Ile | Leu |
| 385 |     |     |     |     | 390 |     |     |     |     | 395 |     |     |     |     | 400 |
| Tyr | Asp | Asp | Ile | Tyr | Lys | Leu | Asp | Leu | Arg | Ala | Ala | Ala | Val | Ser | Thr |
|     |     |     |     | 405 |     |     |     |     | 410 |     |     |     |     | 415 |     |
| Ile | Gln | Gly | Ala | Met | Asp | Thr | Thr | Phe | Gly | Val | Ser | Ser | Ser | Arg | Phe |
|     |     |     | 420 |     |     |     |     | 425 |     |     |     |     | 430 |     |     |
| Phe | Asp | Ile | Arg | Gly | Arg | Asn | Gln | Leu | Tyr | Gln | Ser | Asn | Lys | Pro | Tyr |
|     |     | 435 |     |     |     |     | 440 |     |     |     |     | 445 |     |     |     |
| Pro | Ser | Leu | Pro | Ile | Thr | Ile | Thr | Phe | Pro | Gly | Glu | Glu | Ser | Ser | Glu |
|     | 450 |     |     |     |     | 455 |     |     |     |     | 460 |     |     |     |     |
| Gly | Asn | Ala | Asn | Asp | Tyr | Ser | His | Leu | Leu | Cys | Asp | Val | Lys | Ile | Leu |
| 465 |     |     |     |     | 470 |     |     |     |     | 475 |     |     |     |     | 480 |
| Gln | Glu | Asp | Ser | Ser | Asn | Ile | Cys | Glu | Gly | Arg | Ser | Ser | Leu | Leu | Ser |
|     |     |     |     | 485 |     |     |     |     | 490 |     |     |     |     | 495 |     |
| His | Ala | Trp | Thr | His | Ala | Ser | Leu | Asp | Arg | Asn | Asn | Thr | Ile | Leu | Pro |
|     |     |     | 500 |     |     |     |     | 505 |     |     |     |     | 510 |     |     |
| Asp | Glu | Ile | Thr | Gln | Ile | Pro | Ala | Val | Thr | Ala | Tyr | Glu | Leu | Arg | Gly |
|     |     | 515 |     |     |     |     | 520 |     |     |     |     | 525 |     |     |     |
| Asn | Ser | Ser | Val | Val | Ala | Gly | Pro | Gly | Ser | Thr | Gly | Gly | Asp | Leu | Val |
|     | 530 |     |     |     |     | 535 |     |     |     |     | 540 |     |     |     |     |
| Lys | Met | Ser | Tyr | His | Ser | Val | Trp | Ser | Phe | Lys | Val | Tyr | Cys | Ser | Glu |
| 545 |     |     |     |     | 550 |     |     |     |     | 555 |     |     |     |     | 560 |
| Leu | Lys | Asn | Tyr | Arg | Val | Arg | Ile | Arg | Tyr | Ala | Ser | His | Gly | Asn | Cys |
|     |     |     |     | 565 |     |     |     |     | 570 |     |     |     |     | 575 |     |
| Gln | Phe | Leu | Met | Lys | Arg | Trp | Pro | Ser | Thr | Gly | Val | Ala | Pro | Arg | Gln |
|     |     |     | 580 |     |     |     |     | 585 |     |     |     | 590 |     |     |     |
| Trp | Ala | Arg | His | Asn | Val | Gln | Gly | Thr | Phe | Ser | Asn | Ser | Met | Arg | Tyr |

|     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |  |  |  |  |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|--|--|--|--|
|     | 595 |     |     |     |     | 600 |     |     |     |     |     | 605 |     |     |     |  |  |  |  |
| Glu | Ala | Phe | Lys | Tyr | Leu | Asp | Ile | Phe | Thr | Ile | Thr | Pro | Glu | Glu | Asn |  |  |  |  |
|     | 610 |     |     |     |     | 615 |     |     |     |     |     | 620 |     |     |     |  |  |  |  |
| Asn | Phe | Ala | Phe | Thr | Ile | Asp | Leu | Glu | Ser | Gly | Gly | Asp | Leu | Phe | Ile |  |  |  |  |
| 625 |     |     |     |     | 630 |     |     |     |     | 635 |     |     |     |     | 640 |  |  |  |  |
| Asp | Lys | Ile | Glu | Phe | Ile | Pro | Val | Ser | Gly | Ser | Ala | Phe | Glu | Tyr | Glu |  |  |  |  |
|     |     |     |     | 645 |     |     |     |     | 650 |     |     |     |     | 655 |     |  |  |  |  |
| Gly | Lys | Gln | Asn | Ile | Glu | Lys | Thr | Gln | Lys | Ala | Val | Asn | Asp | Leu | Phe |  |  |  |  |
|     |     |     | 660 |     |     |     |     | 665 |     |     |     |     | 670 |     |     |  |  |  |  |
| Ile | Asn |     |     |     |     |     |     |     |     |     |     |     |     |     |     |  |  |  |  |

<210> 21

<211> 675

<212> PRT

<213> Bacillus thuringiensis

<400> 21

|     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |  |  |  |  |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|--|--|--|--|
| Met | Asn | Pro | Tyr | Gln | Asn | Lys | Ser | Glu | Cys | Glu | Ile | Leu | Asn | Ala | Pro |  |  |  |  |
| 1   |     |     |     | 5   |     |     |     | 10  |     |     |     |     | 15  |     |     |  |  |  |  |
| Leu | Asn | Asn | Ile | Asn | Met | Pro | Asn | Arg | Tyr | Pro | Phe | Ala | Asn | Asp | Pro |  |  |  |  |
|     |     |     | 20  |     |     |     |     | 25  |     |     |     |     | 30  |     |     |  |  |  |  |
| Asn | Ala | Val | Met | Lys | Asn | Gly | Asn | Tyr | Lys | Asp | Trp | Leu | Asn | Glu | Cys |  |  |  |  |
|     |     |     | 35  |     |     | 40  |     |     |     |     |     | 45  |     |     |     |  |  |  |  |
| Asp | Gly | Ile | Thr | Pro | Ser | Ile | Phe | Gly | Thr | Leu | Gly | Val | Leu | Ala | Ser |  |  |  |  |
|     | 50  |     |     |     |     | 55  |     |     |     |     | 60  |     |     |     |     |  |  |  |  |
| Ile | Val | Ile | Ser | Thr | Ile | Asn | Leu | Ala | Thr | Ser | Pro | Ser | Ile | Gly | Asp |  |  |  |  |
| 65  |     |     |     |     | 70  |     |     |     |     | 75  |     |     |     |     | 80  |  |  |  |  |
| Ala | Phe | Ala | Leu | Val | Ser | Ser | Ile | Gly | Glu | Tyr | Trp | Pro | Glu | Thr | Lys |  |  |  |  |
|     |     |     |     | 85  |     |     |     | 90  |     |     |     |     |     | 95  |     |  |  |  |  |
| Thr | Ser | Phe | Pro | Leu | Ser | Val | Ala | Asp | Val | Asn | Arg | Leu | Ile | Arg | Glu |  |  |  |  |
|     |     |     | 100 |     |     |     |     | 105 |     |     |     |     | 110 |     |     |  |  |  |  |
| Ala | Leu | Asp | Gln | Asn | Ala | Ile | Asn | Arg | Ala | Thr | Gly | Lys | Phe | Asn | Gly |  |  |  |  |
|     |     | 115 |     |     |     |     | 120 |     |     |     |     | 125 |     |     |     |  |  |  |  |
| Leu | Met | Asp | Thr | Tyr | Asn | Thr | Val | Tyr | Leu | Lys | Asn | Leu | Gln | Asp | Trp |  |  |  |  |
|     | 130 |     |     |     |     | 135 |     |     |     |     | 140 |     |     |     |     |  |  |  |  |
| Tyr | Asp | Thr | Arg | Ile | Pro | Ala | Asn | Pro | Gln | Gly | Asp | Ser | Gln | Leu | Arg |  |  |  |  |
| 145 |     |     |     |     | 150 |     |     |     |     | 155 |     |     |     |     | 160 |  |  |  |  |
| Glu | Ala | Ala | Arg | Arg | Ser | Leu | Glu | Glu | Ile | Glu | Arg | Asp | Phe | Arg | Lys |  |  |  |  |
|     |     |     |     | 165 |     |     |     |     |     | 170 |     |     |     | 175 |     |  |  |  |  |
| Ala | Leu | Ala | Gly | Glu | Phe | Ala | Glu | Ala | Gly | Ser | Gln | Ile | Val | Leu | Leu |  |  |  |  |
|     |     |     | 180 |     |     |     |     | 185 |     |     |     |     | 190 |     |     |  |  |  |  |
| Pro | Ile | Tyr | Ala | Gln | Ala | Ala | Asn | Ile | His | Leu | Leu | Ile | Leu | Lys | Asp |  |  |  |  |
|     |     | 195 |     |     |     |     | 200 |     |     |     |     |     | 205 |     |     |  |  |  |  |
| Ala | Met | Gln | Phe | Arg | Thr | Asp | Leu | Gly | Leu | Ile | Arg | Pro | Val | Gly | Val |  |  |  |  |
|     | 210 |     |     |     |     | 215 |     |     |     |     |     | 220 |     |     |     |  |  |  |  |
| Pro | Ile | Thr | Thr | Ser | Ala | Glu | Asp | Pro | Phe | Glu | Ser | Glu | Phe | Leu | Leu |  |  |  |  |
| 225 |     |     |     |     | 230 |     |     |     |     |     | 235 |     |     |     | 240 |  |  |  |  |
| Arg | Ile | Lys | Lys | Tyr | Thr | Asp | His | Cys | Ile | Ser | Tyr | Tyr | Asp | Asp | Gly |  |  |  |  |
|     |     |     |     | 245 |     |     |     |     |     | 250 |     |     |     | 255 |     |  |  |  |  |
| Leu | Ala | Lys | Ile | Arg | Ser | Arg | Gly | Ser | Asp | Gly | Glu | Thr | Trp | Trp | Glu |  |  |  |  |
|     |     |     | 260 |     |     |     |     | 265 |     |     |     |     | 270 |     |     |  |  |  |  |
| Phe | Asn | Lys | Phe | Arg | Arg | Glu | Met | Thr | Leu | Thr | Val | Leu | Asp | Leu | Val |  |  |  |  |
|     |     | 275 |     |     |     |     | 280 |     |     |     |     | 285 |     |     |     |  |  |  |  |
| Ala | Leu | Tyr | Pro | Thr | His | Asn | Ile | Lys | Leu | Tyr | Pro | Ile | Pro | Thr | Gln |  |  |  |  |
|     | 290 |     |     |     |     | 295 |     |     |     |     | 300 |     |     |     |     |  |  |  |  |

|     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Thr | Glu | Leu | Ser | Arg | Val | Val | Tyr | Thr | Asp | Pro | Val | Gly | Cys | Phe | Gly |
| 305 |     |     |     |     | 310 |     |     |     |     | 315 |     |     |     |     | 320 |
| Asn | Arg | Lys | Ser | Asp | Ile | Phe | Ser | Arg | Leu | Asn | Phe | Asp | Tyr | Leu | Glu |
|     |     |     |     | 325 |     |     |     |     | 330 |     |     |     |     |     | 335 |
| Asn | Arg | Leu | Thr | Arg | Pro | Arg | Glu | Pro | Phe | Asn | Tyr | Leu | Asn | Ser | Val |
|     |     |     | 340 |     |     |     |     | 345 |     |     |     |     |     | 350 |     |
| Gln | Leu | Phe | Ala | Ser | Thr | Val | Ser | Asn | Ser | Asn | Asn | Gly | Glu | Val | Leu |
|     |     | 355 |     |     |     |     | 360 |     |     |     |     |     | 365 |     |     |
| Arg | Gly | Asn | Leu | Asn | Lys | Ile | Met | Phe | Glu | Gly | Gly | Trp | Thr | Ala | Ser |
|     | 370 |     |     |     |     | 375 |     |     |     |     |     | 380 |     |     |     |
| Arg | Ser | Gly | Asp | Gly | Val | Thr | Thr | Gly | Thr | Pro | Phe | Ser | Thr | Met | Asp |
| 385 |     |     |     |     | 390 |     |     |     |     | 395 |     |     |     |     | 400 |
| Trp | Ser | Tyr | Gly | Trp | Gly | Tyr | Pro | Arg | Lys | His | Tyr | Ala | Glu | Ile | Thr |
|     |     |     | 405 |     |     |     |     |     | 410 |     |     |     |     |     | 415 |
| Ser | Arg | Ser | Gln | Ala | Leu | Pro | Gly | Leu | Asn | Asn | Ser | Ile | His | Val | Ile |
|     |     |     | 420 |     |     |     |     | 425 |     |     |     |     |     | 430 |     |
| Val | Gly | Ile | Asp | Ser | Phe | Arg | Ala | Ile | Gly | Pro | Gly | Gly | Gln | Gly | Asp |
|     |     | 435 |     |     |     |     | 440 |     |     |     |     |     | 445 |     |     |
| His | Thr | Phe | Ser | Leu | Pro | Gly | Gly | Asp | Met | Tyr | Asp | Cys | Gly | Lys | Val |
|     | 450 |     |     |     |     | 455 |     |     |     |     | 460 |     |     |     |     |
| Gln | Ile | Asn | Pro | Leu | Glu | Asp | Tyr | Arg | Asn | Ser | Asp | His | Trp | Ile | Ser |
| 465 |     |     |     |     | 470 |     |     |     |     | 475 |     |     |     |     | 480 |
| Asp | Met | Met | Thr | Ile | Asn | Gln | Ser | Val | Gln | Leu | Ala | Ser | Asn | Pro | Thr |
|     |     |     | 485 |     |     |     |     |     | 490 |     |     |     |     |     | 495 |
| Gln | Thr | Phe | Ala | Phe | Ser | Ala | Leu | Ser | Leu | Gly | Trp | His | His | Ser | Ser |
|     |     |     | 500 |     |     |     |     | 505 |     |     |     |     |     | 510 |     |
| Ala | Gly | Asn | Arg | Asn | Val | Tyr | Val | Tyr | Asp | Lys | Ile | Thr | Gln | Ile | Pro |
|     |     | 515 |     |     |     |     | 520 |     |     |     |     |     |     | 525 |     |
| Ala | Thr | Lys | Thr | Val | Arg | Glu | His | Pro | Met | Ile | Lys | Gly | Pro | Gly | Phe |
|     | 530 |     |     |     |     | 535 |     |     |     |     | 540 |     |     |     |     |
| Thr | Gly | Gly | Asp | Leu | Ala | Asp | Leu | Ser | Ser | Asn | Ser | Asp | Ile | Leu | Gln |
| 545 |     |     |     |     | 550 |     |     |     |     | 555 |     |     |     |     | 560 |
| Tyr | Asp | Leu | Arg | Ser | Asp | Tyr | Asp | Asp | Arg | Leu | Thr | Glu | Asp | Val | Pro |
|     |     |     | 565 |     |     |     |     |     | 570 |     |     |     |     |     | 575 |
| Phe | Arg | Ile | Arg | Ile | Arg | Cys | Ala | Ser | Ile | Gly | Val | Ser | Thr | Ile | Ser |
|     |     |     | 580 |     |     |     |     | 585 |     |     |     |     |     | 590 |     |
| Val | Asp | Asn | Trp | Gly | Ser | Ser | Ser | Pro | Gln | Val | Thr | Val | Ala | Ser | Thr |
|     |     | 595 |     |     |     |     | 600 |     |     |     |     |     |     | 605 |     |
| Ala | Ala | Ser | Leu | Asp | Thr | Leu | Lys | Tyr | Glu | Ser | Phe | Gln | Tyr | Val | Ser |
|     | 610 |     |     |     |     | 615 |     |     |     |     | 620 |     |     |     |     |
| Ile | Pro | Gly | Asn | Tyr | Tyr | Phe | Asp | Ser | Ala | Pro | Arg | Ile | Arg | Leu | Leu |
| 625 |     |     |     |     | 630 |     |     |     |     | 635 |     |     |     |     | 640 |
| Arg | Gln | Pro | Gly | Arg | Leu | Leu | Val | Asp | Arg | Ile | Glu | Ile | Ile | Pro | Val |
|     |     |     | 645 |     |     |     |     |     | 650 |     |     |     |     | 655 |     |
| Asn | Phe | Phe | Pro | Leu | Ser | Glu | Gln | Glu | Asn | Lys | Ser | Val | Asp | Ser | Leu |
|     |     |     | 660 |     |     |     |     | 665 |     |     |     |     |     | 670 |     |
| Phe | Ile | Asn |     |     |     |     |     |     |     |     |     |     |     |     |     |
|     |     | 675 |     |     |     |     |     |     |     |     |     |     |     |     |     |

<210> 22

<211> 659

<212> PRT

<213> Bacillus thuringiensis

<400> 22

Asn Ser Tyr Glu Asn Lys Asn Glu Tyr Glu Ile Leu Asn Asp Ser Lys

|     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 1   |     |     |     | 5   |     |     |     |     | 10  |     |     |     | 15  |     |     |
| Lys | Ser | Asn | Met | Ser | Asn | Pro | Tyr | Leu | Arg | Tyr | Pro | Leu | Ala | Asn | Asp |
|     |     |     | 20  |     |     |     |     | 25  |     |     |     |     | 30  |     |     |
| Ser | Leu | Ala | Ser | Met | Gln | Asn | Thr | Asn | Tyr | Lys | Asp | Trp | Leu | Thr | Met |
|     |     | 35  |     |     |     |     | 40  |     |     |     |     | 45  |     |     |     |
| Cys | Asp | Arg | Thr | Asp | Thr | Asp | Val | Leu | Ser | Ser | Arg | Gly | Ala | Val | Ser |
|     | 50  |     |     |     |     | 55  |     |     |     | 60  |     |     |     |     |     |
| Thr | Gly | Val | Gly | Met | Leu | Ser | Thr | Ile | Leu | Ser | Leu | Phe | Gly | Ile | Pro |
| 65  |     |     |     |     | 70  |     |     |     |     | 75  |     |     |     | 80  |     |
| Leu | Ile | Gly | Glu | Gly | Ile | Asp | Leu | Leu | Leu | Gly | Ala | Ala | Asp | Phe | Leu |
|     |     |     |     | 85  |     |     |     | 90  |     |     |     |     |     | 95  |     |
| Trp | Pro | Glu | Ser | Asp | Gly | Gly | His | Gln | Tyr | Thr | Trp | Glu | Asp | Leu | Met |
|     |     |     | 100 |     |     |     |     | 105 |     |     |     |     | 110 |     |     |
| Asn | His | Ile | Glu | Glu | Leu | Met | Asp | Glu | Arg | Leu | Glu | Thr | Glu | Lys | Arg |
|     |     | 115 |     |     |     |     | 120 |     |     |     |     | 125 |     |     |     |
| Thr | Thr | Ala | Leu | Asp | Asp | Leu | Arg | Gly | Leu | Lys | Ala | Leu | Leu | Gly | Leu |
|     | 130 |     |     |     |     | 135 |     |     |     |     | 140 |     |     |     |     |
| Phe | Arg | Asp | Ala | Phe | Asp | Ser | Trp | Glu | Lys | Asn | Gln | Asn | Asp | Pro | Ile |
| 145 |     |     |     |     | 150 |     |     |     |     | 155 |     |     |     | 160 |     |
| Ala | Lys | Asn | Arg | Val | Gly | Gly | Tyr | Phe | Glu | Asp | Val | His | Thr | His | Phe |
|     |     |     |     | 165 |     |     |     | 170 |     |     |     |     | 175 |     |     |
| Val | Lys | Asp | Met | Ala | Ser | Ile | Phe | Ser | Ala | Thr | Asn | Tyr | Glu | Val | Leu |
|     |     |     | 180 |     |     |     |     | 185 |     |     |     |     | 190 |     |     |
| Leu | Leu | Pro | Val | Tyr | Ala | Gln | Ala | Ala | Asn | Leu | His | Leu | Leu | Leu | Leu |
|     | 195 |     |     |     |     |     | 200 |     |     |     |     | 205 |     |     |     |
| Arg | Glu | Gly | Val | Ile | Tyr | Gly | Ser | Arg | Trp | Gly | Ile | Ala | Pro | Ala | Ala |
|     | 210 |     |     |     |     | 215 |     |     |     |     | 220 |     |     |     |     |
| Asp | Phe | Tyr | His | Asp | Gln | Leu | Leu | Lys | Tyr | Thr | Ala | Ile | Tyr | Ala | Asn |
| 225 |     |     |     |     | 230 |     |     |     |     | 235 |     |     |     | 240 |     |
| His | Cys | Val | Thr | Trp | Tyr | Asn | Asn | Gly | Leu | Ala | Gln | Gln | Lys | Glu | Leu |
|     |     |     |     | 245 |     |     |     | 250 |     |     |     |     |     | 255 |     |
| Phe | Ala | Lys | Ser | Pro | Asn | Trp | Asn | Arg | Phe | Asn | Ala | Tyr | Arg | Arg | Asp |
|     |     |     | 260 |     |     |     |     | 265 |     |     |     |     | 270 |     |     |
| Met | Thr | Ile | Thr | Val | Leu | Asp | Ile | Ile | Ala | Leu | Phe | Pro | Thr | Tyr | Asp |
|     |     | 275 |     |     |     |     | 280 |     |     |     |     | 285 |     |     |     |
| Ala | Arg | Leu | Tyr | Thr | Lys | Pro | Ile | Lys | Thr | Glu | Leu | Thr | Arg | Glu | Ile |
|     | 290 |     |     |     |     | 295 |     |     |     | 300 |     |     |     |     |     |
| Tyr | Ser | Asp | Val | Leu | Asn | Leu | Asp | Val | Tyr | Gly | Val | Gln | Gln | Thr | Asp |
| 305 |     |     |     |     | 310 |     |     |     |     | 315 |     |     |     | 320 |     |
| Leu | Asn | Lys | Asn | Glu | Ala | Ala | Phe | Thr | Arg | Ser | Pro | His | Leu | Val | Thr |
|     |     |     |     | 325 |     |     |     | 330 |     |     |     |     | 335 |     |     |
| Arg | Leu | Arg | Gly | Phe | Asp | Phe | Tyr | Thr | Arg | Thr | Lys | Tyr | Ala | Tyr | Trp |
|     |     |     | 340 |     |     |     |     | 345 |     |     |     |     | 350 |     |     |
| Arg | Tyr | Leu | Ala | Gly | His | Thr | Asn | Tyr | Phe | Ser | Phe | Thr | Gly | Asn | Gly |
|     |     | 355 |     |     |     |     | 360 |     |     |     |     | 365 |     |     |     |
| Thr | Ile | Tyr | Ser | Ser | Ser | Phe | Asn | Asn | Trp | Tyr | Asp | Thr | Asp | Met | Thr |
|     | 370 |     |     |     |     | 375 |     |     |     |     | 380 |     |     |     |     |
| Lys | Ser | Thr | Ile | Asn | Ile | Pro | Asp | Tyr | Ala | Asn | Ile | Tyr | Lys | Leu | Trp |
| 385 |     |     |     |     | 390 |     |     |     |     | 395 |     |     |     | 400 |     |
| Thr | Lys | Ser | Tyr | Thr | Asn | Ile | Ser | Pro | Tyr | Thr | Asp | Pro | Val | Gly | Ile |
|     |     |     |     | 405 |     |     |     | 410 |     |     |     |     | 415 |     |     |
| Ser | Gln | Met | Gln | Phe | Ser | Leu | Thr | Asn | Asn | Gln | Gln | Leu | Thr | Tyr | Thr |
|     |     |     | 420 |     |     |     |     | 425 |     |     |     | 430 |     |     |     |
| Gly | Thr | Ser | Ala | Pro | Lys | Tyr | Pro | Val | Arg | Glu | Thr | Phe | Phe | Glu | Ile |
|     |     | 435 |     |     |     |     | 440 |     |     |     |     | 445 |     |     |     |
| Pro | Pro | Thr | Asp | Glu | Lys | Pro | Leu | Thr | Tyr | Glu | Asn | Tyr | Ser | His | Ile |
|     | 450 |     |     |     |     | 455 |     |     |     |     | 460 |     |     |     |     |

|     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Leu | Ser | Tyr | Met | Thr | Ser | Ala | Gln | His | Phe | Gly | Asp | Lys | Lys | Ile | Gly |
| 465 |     |     |     |     | 470 |     |     |     |     | 475 |     |     |     |     | 480 |
| Tyr | Thr | Phe | Ala | Trp | Met | His | Glu | Ser | Val | Asp | Phe | Asp | Asn | Arg | Val |
|     |     |     |     | 485 |     |     |     |     | 490 |     |     |     |     | 495 |     |
| Asp | Pro | Asp | Lys | Ile | Thr | Gln | Ile | Pro | Ala | Val | Lys | Gly | Asp | Tyr | Leu |
|     |     |     | 500 |     |     |     |     | 505 |     |     |     |     | 510 |     |     |
| Gln | Tyr | Gly | Tyr | Val | Lys | Gln | Gly | Pro | Gly | His | Thr | Gly | Gly | Asp | Leu |
|     |     | 515 |     |     |     |     | 520 |     |     |     |     | 525 |     |     |     |
| Val | Ser | Met | Ile | Arg | Thr | Asp | Arg | Leu | Gly | Ile | Asn | Val | Tyr | Phe | Pro |
|     | 530 |     |     |     |     | 535 |     |     |     |     | 540 |     |     |     |     |
| Gln | Pro | Leu | Asp | Tyr | Arg | Ile | Arg | Ile | Arg | Tyr | Ser | Thr | Ser | Ser | Asn |
| 545 |     |     |     |     | 550 |     |     |     |     | 555 |     |     |     |     | 560 |
| Gly | Tyr | Leu | Tyr | Ile | Tyr | Ser | Pro | Asn | Thr | Lys | Ile | Val | Tyr | Leu | Pro |
|     |     |     |     | 565 |     |     |     |     | 570 |     |     |     |     | 575 |     |
| Pro | Thr | Thr | Leu | Val | Asp | Gly | Gln | Pro | Thr | Phe | Asp | Pro | Met | Asp | Phe |
|     |     |     | 580 |     |     |     |     | 585 |     |     |     |     | 590 |     |     |
| Ser | Ala | Phe | Arg | Val | Val | Glu | Val | Pro | Ala | Ser | Phe | Arg | Ala | Ser | Val |
|     |     | 595 |     |     |     |     | 600 |     |     |     |     | 605 |     |     |     |
| Ala | Gly | Tyr | Thr | Asn | Phe | Thr | Ile | Glu | Ala | Gly | Phe | Gly | Pro | Val | Tyr |
|     | 610 |     |     |     |     | 615 |     |     |     |     | 620 |     |     |     |     |
| Ile | Asp | Lys | Ile | Glu | Phe | Ile | Pro | Asp | Asn | Thr | Thr | Thr | Leu | Glu | Tyr |
| 625 |     |     |     |     | 630 |     |     |     |     | 635 |     |     |     |     | 640 |
| Glu | Gly | Gly | Arg | Asp | Leu | Glu | Lys | Thr | Lys | Asn | Ala | Val | Asn | Asp | Leu |
|     |     |     |     | 645 |     |     |     |     | 650 |     |     |     |     | 655 |     |
| Phe | Thr | Asn |     |     |     |     |     |     |     |     |     |     |     |     |     |

<210> 23

<211> 666

<212> PRT

<213> *Bacillus thuringiensis*

<400> 23

|     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Asn | Ser | Tyr | Glu | Asn | Lys | Asn | Glu | Tyr | Glu | Ile | Leu | Glu | Ser | Ser | Ser |
| 1   |     |     |     | 5   |     |     |     |     | 10  |     |     |     |     | 15  |     |
| Asn | Asn | Thr | Asn | Met | Pro | Asn | Arg | Tyr | Pro | Phe | Ala | Asn | Asp | Arg | Asp |
|     |     |     | 20  |     |     |     |     | 25  |     |     |     |     | 30  |     |     |
| Met | Ser | Thr | Met | Ser | Phe | Asn | Asp | Cys | Gln | Gly | Ile | Ser | Trp | Asp | Glu |
|     |     | 35  |     |     |     |     | 40  |     |     |     |     | 45  |     |     |     |
| Ile | Trp | Glu | Ser | Ala | Glu | Thr | Ile | Thr | Ser | Ile | Gly | Ile | Asp | Leu | Ile |
|     | 50  |     |     |     |     | 55  |     |     |     |     | 60  |     |     |     |     |
| Glu | Phe | Leu | Met | Glu | Pro | Ser | Leu | Gly | Gly | Ile | Asn | Thr | Leu | Phe | Ser |
| 65  |     |     |     |     | 70  |     |     |     |     | 75  |     |     |     | 80  |     |
| Ile | Ile | Gly | Lys | Leu | Ile | Pro | Thr | Asn | His | Gln | Ser | Val | Ser | Ala | Leu |
|     |     |     | 85  |     |     |     |     | 90  |     |     |     |     |     | 95  |     |
| Ser | Ile | Cys | Asp | Leu | Leu | Ser | Ile | Ile | Arg | Lys | Glu | Val | Ala | Asp | Ser |
|     |     |     | 100 |     |     |     |     | 105 |     |     |     |     | 110 |     |     |
| Val | Leu | Ser | Asp | Ala | Ile | Cys | Arg | Phe | Leu | Asp | Gly | Lys | Leu | Lys | Asn |
|     |     | 115 |     |     |     |     | 120 |     |     |     |     | 125 |     |     |     |
| Tyr | Arg | Glu | Tyr | Tyr | Leu | Pro | Tyr | Leu | Glu | Ala | Trp | Leu | Lys | Asp | Gly |
|     | 130 |     |     |     |     | 135 |     |     |     |     | 140 |     |     |     |     |
| Lys | Pro | Leu | Gln | Lys | Thr | Asn | Asn | Ser | Asp | Ile | Gly | Gln | Leu | Val | Lys |
| 145 |     |     |     |     | 150 |     |     |     |     | 155 |     |     |     |     | 160 |
| Tyr | Phe | Glu | Leu | Ser | Glu | Arg | Asp | Phe | Asn | Glu | Ile | Leu | Gly | Gly | Ser |
|     |     |     |     | 165 |     |     |     |     | 170 |     |     |     |     | 175 |     |
| Leu | Ala | Arg | Asn | Asn | Ala | Gln | Ile | Leu | Leu | Leu | Pro | Tyr | Phe | Cys | Ala |

46

|     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Asn | Ser | Thr | Ala | Leu | Glu | Tyr | Glu | Gly | Lys | Gln | Ser | Leu | Glu | Lys | Ala |
|     |     |     |     | 645 |     |     |     |     | 650 |     |     |     |     | 655 |     |
| Gln | Asp | Val | Val | Asn | Asp | Leu | Phe | Val | Lys |     |     |     |     |     |     |
|     |     |     | 660 |     |     |     |     | 665 |     |     |     |     |     |     |     |